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OSLER (Sir W). *contd.*

3576. Published Memoirs and Communications (to Jan. 1st, 1882). For private circulation. [Continued as:] Collected Reprints. 2nd-6th series. 8°. v. pl., (1874-1920).

Bd. in 7 vols. (the 6th series being in 2 vols.). See note to no. 3269. Nine similar sets were distributed to medical libraries in Canada, the U.S., and England. The contents of the sets are not complete nor identical. In the following list the numbers and titles are taken from the printed 'Titles of papers' prefixed to each series. Items omitted from those lists, but included in this set, have a number in brackets, e. g. [7 a]. Contents.

1st SERIES (1870-81)

1. On Canadian Diatomaceae. [*Missing; the MS. is in no. 7661, v.*]
2. Action of atropia and physostigma on the colourless blood corpuscles. [*Missing; the MS. is no. 7640.*]
3. On certain organisms in the liquor sanguinis. [With plate (*the blood-platelets*).]
4. Valedictory remarks to Class '75, McGill Univ.
5. Case of scarlatina miliaris.
6. Histology of leucocythemia.
7. Pathology of miner's lung.
- [7 a]. Empyema. [*Duplicate of 50, with MS. additions.*]
- 8-10. Clinical notes on small-pox [3 papers on initial rashes and the hæmorrhagic form].
11. Trichina spiralis. [*Missing.*]

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12. Verminous bronchitis in dogs (with description of a new parasite). *Orderus plani insert*
13. Aneurism of hepatic artery (with Dr. Ross).
14. Introductory lecture . . . 45th session of the Med. Faculty, McGill.
15. Case of progressive pernicious anæmia (with Dr. Gardner).
16. Case of progressive pernicious anæmia (with Dr. Bell).
17. Beschaffenheit d. Blutes u. Knochenmarkes in d. progressiven perniciosén Anämie [with Dr. Gardner].
18. Beschaffenheit d. Blutes u. Knochenmarkes bei perniciosér Anämie.
19. Over-strain of the heart.
20. Pathology of pig-typhoid.
21. Die Entwicklung von Blutkörperchen im Knochenmark bei perniciosér Anämie.
22. Pathological report, vol. 1. [Cf. no. 3536.]
23. Croup or diphtheria, which?
24. Obliteration of vena cava inferior. [With plate.]
25. Congenital and progressive hypertrophy of rt. upper extremity.
26. Striated myo-sarcoma of kidney.
27. Cardiac abnormalities (with 2 plates [at end of next paper]).
28. Fusion of two segments of the semilunar valves (with plate).
29. Pathological report, No. 2. [Cf. no. 3537.]
30. Systolic brain murmur of children.
31. Insular sclerosis.
32. Delayed resolution in pneumonia.
33. Heredity in progressive muscular atrophy as illustr. by the Farr family. [Inserted at end of vol. : six letters concerning further cases.]
34. Remarkable heart-murmur, heard at a distance. [Missing.]
35. Medullary neuroma of brain (with plate).
36. Infectious (so-called ulcerative) endocarditis (with plate).
37. Cases of Hodgkin's disease.
- [38]. Obituary. Chas. F. A. Locke.
39. Clinical lecture on idiopathic or pernicious anæmia.
40. Clinical lecture on fibroid phthisis.
41. On some effects of the chr. impaction of gall stones . . . and on the "fièvre intermittente hépatique" of Charcot.
42. Renal cirrhosis.
- [42 a]. Catalogue of specimens . . . brain and spinal cord.
43. Intestinal diverticula.

2nd SERIES (1882-91)

44. Etiology and pathology of ulcerative endocarditis.
45. Brains of criminals.
46. Obliteration of portal vein.
47. Ueber d. dritten Formbestandtheil d. Blutes.
48. Summer session clinics—4 articles.
49. Cestode tuberculosis.
50. Empyema and its antiseptic treatment. [Cf. 7 a.]
51. Uraemic delirium and coma.
52. Parasites of the blood of the frog.
53. Canadian fresh water Polyzoa.
54. Parasites in the pork supply of Montreal.

- 54 a. Haematemesis in splenic tumour. [Missing.]
 55. A case of Hodgkin's disease (with plate).
 56. Preataxic tabes dorsalis.
 57. The third corpuscle of the blood.
 58. Natural modes of cure in empyema.
 59. Study of the brains of Richards and O'Rourke.
 60. Studies of clinical cases.
 61. Jacksonian epilepsy.
 62. Echinococcus disease in America.
 63. Endocarditis. [Another ed. of no. 3539.]
 64. Morbid anatomy of pneumonia.
 65. Morbid anatomy of typhoid.
 [65 a]. Extracts from Pathological Soc. of Phila., vols. 12-13.
 66. Diseases of the substance of the heart. [Missing here; see no. 3540.]
 67. Diseases of the haematopoietic system. [Missing here; see no. 3541.]
 68. On the growth of a profession (Presidential address, C. M. A.). [Missing.]
 69. Retro-peritoneal sarcoma [in 65 a, at p. 13].
 70. Atrophy of the stomach (with Dr. Henry).
 71. Cartwright lectures on the blood.
 72. Bicuspid condition of the aortic valves.
 73. Use of arsenic in certain forms of anaemia.
 74. Duodenal ulcer.
 75. Cerebral aneurisms. [Missing.]
 76. Malaria. [Catalogued as no. 1693.]
 77. On antifebrin.
 78. Cardiac relations of chorea.
 79. Haemorrhagic infarction. [Missing.]
 80. On chorea; two lectures. [Missing. Re-published in no. 3562.]
 81. Cholesteatoma.
 82. Hereditary angio-neurotic oedema.
 83. Nitro-glycerine in epilepsy. [Missing.]
 84. Diagnosis of small-pox.
 85. Glioma of medulla.
 [85 a]. Typhlitis and appendicitis.
 86. Cerebral palsies... [Missing. Republished in no. 3542.]
 87. Cases of disease of caecum and appendix. [Missing.]
 88. Puerperal anaemia.
 89. Diagnosis of duodenal ulcer.
 90. Pachymeningitis haemorrhagica. [Missing.]
 91. Lesions of the cauda equina.
 92. A form of purpura.
 93. Mortality of pneumonia.
 94. Phagocytes.
 95. Pulsating pleurisy.
 96. The license to practise.
 97. Aequanimitas.
 98. Intrathoracic growths developing from the thyroid.
 99. Idiopathic muscular atrophy.
 100. Syphiloma of cord and cauda equina.
 101. Laveran's organisms... [Catalogued as no. 1694.]
 102. Hepatic intermittent fever.
 103. Post-febrile insanity.
 104. Rare forms of cardiac thrombi.
 105. Endocarditis in phthisis.
 106. Tubercular peritonitis.
 107. Ac. nephritis in typhoid.
 108. Amœba coli in dysentery.
 109. Convulsive tic.
 110. Sensory aphasia.
 111. [Virchow. See no. 1663.]

OSLER (Sir WILLIAM) 1849-1919.
 1693. An address on the Hematozoa of Malaria. 8°. (Lond.), [1887].
 Delivered before the Pathol. Soc. of Phila. With figs. Repr. fr. Brit. M. J., 1887, i, p. 556. Inserted: autogr. letter from Laveran, dated 1887, on the classification of the parasites. Bd. as 76 in no. 3576.

1694. On the value of Laveran's Organisms in the Diagnosis of Malaria. 8°. [Baltimore], (1889).
 Repr. fr. Johns Hopkins Hosp. Bull., Dec. 1889, vol. 1, p. 11. Bd. as 101 in no. 3576.

OSLER (Sir WILLIAM) 1849-1919.
 1663. Rudolph Virchow: the Man and the Student. 12°. [Boston], (1891).
 Remarks at the Virchow celebration, Johns Hopkins Univ., 13 Oct., 1891. Repr. fr. Boston Med. and Surg. Jnl., vol. 125, pp. 425-7. Bd. as 111 in no. 3576.

Inserted: autogr. letter from Laveran, dated 1887, on the classification of the parasites.
Bd. as 76 in no. 3576.

Remarks at the Virchow celebration, Johns Hopkins Univ., 13 Oct., 1891. Repr. fr. Boston Med. and Surg. Jnl., vol. 125, pp. 425-7. Bd. as 111 in no. 3576.

112. Diagnosis of tuberculous broncho-pneumonia. [Missing.]
 113. Doctor and nurse.
 114. Hereditary chorea. [Missing.]
 115. General bronchiectasis of left lung. [Missing.]
 116. Obstruction of superior vena cava. [Missing. Cf. no. 5652, ii, p. 40.]
 117. Multiple subcutaneous cysticerci. [Missing. Cf. no. 5652, ii, p. 61.]
- 3rd SERIES (1892-6)
118. Remarks on specialism.
 119. The healing of tuberculosis.
 120. Association of congenital wry-neck with marked facial asymmetry.
 121. Interstitial processes in the central nervous system.
 122. Cold bath treatment of typhoid.
 123. Teacher and student.
 124. Tuberculous pericarditis.
 125. Dilatation of the colon in young children.
 126. Physic . . . in Plato. [Catalogued as no. 225.]
 127. Arterio-venous aneurism of the axillary artery and vein. [Inserted: MS. 'Sequel to the case', &c.]
 128. Chr. intermittent fever of endocarditis.
 129. Varieties of chr. chorea. [Corresp. inserted.]
 130. Arsenical neuritis.
 131. A remarkable house epidemic of typhoid.
 132. Sub-phrenic abscess.
 133. Tuberculous pleurisy (Shattuck lecture).
 134. Tuberculosis.
 135. Diseases of the blood (and of the nervous system [missing]).
 136. Sporadic cretinism in America.
 137. Tuberculosis in children.
 138. Toxæmia in tuberculosis.

139. Parotitis in pneumonia. Pericarditis treated by incision.
- 140-3. Analysis of 229 cases of typhoid. Treatment. Study of the fatal cases. Special symptoms, complications and sequelae.
144. Neurosis following enteric fever . . . "Typhoid spine".
145. Typhoid in Baltimore.
146. Lectures on . . . abdominal tumors. [Missing. See no. 3563.]
147. The army surgeon.
148. The leaven of science. [Corresp. inserted.]
149. On chorea . . . [Missing. See no. 3562.]
150. Oliver Wendell Holmes.
151. Clinical demonstrations on typhoid.
152. Cancer of stomach with very rapid course.
153. Teaching and thinking.
154. Sporadic cretinism.
155. Typhoid in country districts.
156. Visible contractile tumor at the pylorus.
157. Infective diseases (Amer. text-book of nervous diseases).
158. Cold bath treatment of typhoid.
159. Studies in typhoid.
160. Neuritis during and after typhoid.
161. Chills in typhoid.
162. Laveran's discoveries. [Catalogued as no. 1695.]
163. Visceral complications of erythema exudativum multiforme. [Corresp. inserted.]

OSLER (SIR WILLIAM) 1849-1919.

225. Physic and Physicians as depicted in Plato. Read before the Johns Hopkins Hospital Historical Club, Dec. 14, 1892 . . . 8°. Boston, 1893.

Repr. fr. Boston Med. and Surg. Jnl., 1893, vol. 128, pp. 129-33, 153-6.
Inserted: letters from Sir E. H. Sieveking and Walter F. Atlee; and a cutting on 'The Physician in Plato's Republic'.
Pamphlet 126 in no. 3576.

1695. The practical value of Laveran's Discoveries . . . 8°. [Phila. &c.], 1895.
Read before the Med. Soc. of the District of Columbia. Repr. fr. Med. News, 1895, vol. 67, pp. 561-4.
Bd. as 102 in no. 3576.

164. John Keats.
165. Thomas Dover. [Review inserted.]
166. An Alabama student. [Corresp. inserted.]
167. Six cases of Addison's disease.
168. Addison's disease.
169. Heart hypertrophy... with... adherent pericardium.
170. Hemiplegia in typhoid.
171. Treatment of diseases of the blood and ductless glands.
172. Cerebral complications of Raynaud's disease.
173. Lectures on angina... [Missing. Cf. no. 3567.]

4th SERIES (1897-1901)

174. Classification of the tics.
175. Prognosis of pneumonia.
176. Mitral stenosis; sudden death; ball thrombus in lt. auricle.
177. Diagnosis of malarial fever.
178. Unusual forms of paræsthetic meralgia.
179. Functions of a State Faculty.
180. Ball-valve gall-stone in the common duct.
181. Nurse and patient.
182. Influence of Louis on American medicine.
183. British medicine in Greater Britain.
184. Hepatic complications of typhoid.
185. Internal medicine as a vocation.
186. Pneumonia.
187. Occasional notes on American medical classics.
188. Sporadic cretinism in America. [With plates.]
189. Chr. symmetrical enlargement of the salivary and lachrymal glands.
190. Intestinal features of typhoid.
191. Ein Fall von Fistula oesophago-pleurothoracica.
192. Relation of typhoid mortality and sewerage.
193. Leprosy in the U.S.
194. Diffuse scleroderma. [With plate.]
195. Cerebral features of pneumonia.
196. Cerebro-spinal fever.
197. The arthritis of cerebro-spinal fever.
198. The study of pneumonia.
199. Problem of typhoid in the U.S.
200. An acute myxœdematous condition.
201. Clinical features of sporadic trichinosis.
202. In memoriam—William Pepper.
- [202 a]. William Pepper.
203. Sporadic cretinism. [With plates.]
204. Chr. splenic enlargement with recurring gastro-intestinal hæmorrhages.
205. Etiology and diagnosis of cerebro-spinal fever.
206. After twenty-five years.
207. Diagnosis of typhoid.
208. Hypertrophic cirrhosis of the liver.
209. Splenic anæmia.
210. Home treatment of consumption.
211. Multiple gangrene in malarial fever.
212. Latent cancer of the stomach.
213. Visceral lesions of the erythema group.
214. Importance of post-graduate study.
215. Elisha Bartlett.
216. John Locke. [Cf. no. 1061.]
217. Hemiplegia in typhoid.
218. Hepatic complications of typhoid.
- 219-20. [Typhoid fever] Analysis... of cases 1889-1899. Special features.
221. The study of tuberculosis.
222. Perforation and perforative peritonitis in typhoid.

- [222 a]. Cerebro-spinal fever.
- 223. Books and men.
- 224. Progress of medicine in the 19th century.
- 225. Plea for more careful study of the symptoms of perforation in typhoid. [*Missing.*]
- 226. Medical aspects of carcinoma of the breast.
- 227. Advantages of a trace of albumin and a few tube casts in the urine.
- 228. Congenital absence of the abdominal muscles.
- 229. A family form of recurring epistaxis.

5th SERIES (1902-6)

- 230. Diagnosis of bilateral cystic kidney.
- 231. Amebic abscess of the liver.
- 232. Amebic dysentery.
- 233. Ascites in solid abdominal tumors.
- 234. Alfred Stillé.
- 235. Notes on aneurism.
- 236. Heredity in bilateral cystic kidney. [*With MS. additions.*]
- 237. Some aspects of American medical bibliography.
- 238. Chauvinism in medicine. [*Corresp. inserted.*]
- 239. Anaemia splenica (2nd paper).
- 240. William Beaumont. [*Corresp. inserted.*]
- 241. Need of a radical reform in our methods of teaching.
- 242. Aneurism of the descending thoracic aorta.
- 243. Educational value of the medical society.
- 244. Chr. purpuric erythema.
- 245. Obliteration of superior vena cava. [*With plates.*]
- 246. Stokes-Adams disease.
- 247. Chr. cyanosis, with polycythaemia and enlarged spleen; a new clinical entity.
- 248. The master-word in medicine.
- 249. Typhoid and tuberculosis.
- 250. The home in its relation to the tuberculosis problem.
- 251. Visceral manifestations of the erythema group.
- 252. The 'Phthisiologia' of Richard Morton. [*With portrait.*]
- 253. Ochronosis.
- 254. Surgical importance of the visceral crises in the erythema group.
- 255. Unity, peace, and concord.
- 256. The student life.
- 257. Aneurysm of the abdominal aorta.
- 258. Convulsions in typhoid.
- 259. Medical aspects of carcinoma of the breast (2nd paper).
- 260. Angina pectoris as an early symptom in aneurysm of the aorta.
- 261. Religio medici. [*Catalogued as no. 4557.*]
- 262. The growth of truth. [*Cf. no. 773.*]
- 263. Fracastorius. [*Inserted: F. H. Garrison, 'Fracastorius...' from 'Science', 1910, pp. 500-2. Cf. no. 2652.*]

6th SERIES, vol. I (1907-9)

- 264. Cerebro-spinal fever.
- 265. The library of a med. school.
- 266. Abdominal tumours associated with disease of the testicle.
- 267. Royal Medical Society of Edinburgh.
- 268. Multiple hereditary telangiectases with recurring haemorrhages. With plates.

164. John Keats.

165. Thomas Dover [D.]

269. On telangiectasis circumscripta universalis.
[With plates.]

270. Historical development . . . of laboratory and
clinical methods in diagnosis.

271. Ochronosis. With plate.

272. Erythraemia (polycythaemia with cyanosis,
maladie de Vaquez).

273. Vienna after 34 years.

274. Endocarditis infectieuses chroniques.

275. Endocarditis. Diseases of the arteries, &c.

276. What the public can do in the fight against
tuberculosis.

277. Paralyse du nerf récurrent gauche dans les
affections mitrales.

278. Chr. infectious endocarditis.

279. Raynaud's disease; &c.

280. Evolution of internal medicine.

281. Syphilis (with J. W. Churchman).

282. The treatment of disease. [Review inserted.]

283. Old and new.

284. Michael Servetus. [Cf. no. 886.]

6th SERIES, vol. 2 (1909-20)

285. Michael Servetus, ein Märtyrer der Wissen-
schaft. [Cf. no. 886.]

286. The medical library. . . [Cf. no. 7206.]

287. The nation and the tropics.

288. Angina pectoris. [Cf. no. 3575.]

289. Pupil symptoms in thoracic aneurysm.

290. Certain phenomena associated with cervical
rib.

291. Stokes-Adams disease (with A. Keith).
Aneurysm.

292. In memoriam, Dr. J. Hewetson, 1867-1910.

293. The hospital unit in university work.

294. Telangiectasie emorragiche ereditarie.

295. Whole-time clinical professors. A letter to
President Remsen. [Privately pr., 1911.]

296. Transient attacks of aphasia and paralyses.

297. The pathological institute of a general
hospital.

298. Pasteur. [Cf. no. 1557.]

299. High blood pressure.

300. Syphilis of the liver with the picture of
Banti's disease.

301. Specialism in the general hospital.

302. Examinations, examiners and examinees.

303. The medical clinic.

304. Burton's Anatomy. [Cf. no. 4637.]

305. Visceral lesions of purpura.

306. Bacilli and bullets.

307. The War and typhoid fever.

308. Diagnosis of polycystic kidney.

309. Cerebro-spinal fever in camps and barracks.

310. Arterio-venous aneurysm.

311. Nerve and "nerves".

312. Science and war. [Reviews inserted.]

313. Coming of age of internal medicine in America.

314. Intensive work in science at the public
schools.

315. Creators, transmuters and transmitters . . .
[See note to no. 5444.]

316. Illustrations of the book-worm.

317. The anti-venereal campaign.

318. The library school in the college.

319. Essai de bibliographie hippique. [Cf. no.
7208.]

320. Anaesthesia. [Another copy of no. 1365.]

321. Typhoid spine.
322. The severe anaemias of pregnancy.
323. The old humanities. . . [Cf. no. 5257.]
324. 'Sir Victor Horsley'. [A review of no. 3006.]

*Private copy
Dr Osler*

PUBLISHED
MEMOIRS AND COMMUNICATIONS

(To January 1st, 1882.)

BY

WILLIAM OSLER, M. D., M. R. C. P., Lond.,
*Professor of the Institutes of Medicine, McGill University; Physician and Pathologist
to the General Hospital, Montreal.*

FOR PRIVATE CIRCULATION.

Montreal.

1882.

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TITLES OF PAPERS.

- I. On Canadian Diatomaceæ.
(All. no. 7642.) Canadian Naturalist, 1870.
- II. On the action of Atropia and Physostigmia on the Colourless Blood Corpuseles.
Quarterly Microscopical Journal, London, 1873.
- III. On certain Organisms in the Liquor Sanguinis.
Proceedings of the Royal Society, 1874.
- ✓ IV. Valedictory Remarks to Class, '75, McGill University.
Can. Medical & Surgical Journal, 1875.
- ✓ V. Case of Scarlatina miliaris.
Can. Medical & Surgical Journal, 1876.
- ✓ VI. On the Histology of Leucocythemia.
Can. Medical & Surgical Journal, 1876.
- ✓ VII. On the Pathology of Miner's Lung.
Can. Medical & Surgical Journal, 1876.
- ✓ VIII. On the Initial Rashes of Small-pox.
Can. Medical & Surgical Journal, 1876.
- ✓ IX. On hæmorrhagic Small-pox.
Can. Medical & Surgical Journal, 1876.
- ✓ X. A form of hæmorrhagic Small-pox.
Printed with VII. and XI. as a separate brochure, entitled "Clinical Notes on Small-pox." Montreal, 1876.
- XI. On Trichina Spiralis.
Canadian Journal of Med. Sciences, 1876.
- ✓ XII. Verminous Bronchitis in Dogs (with description of a new parasite).
Veterinarian, London, 1877.
- ✓ XIII. Aneurism of Hepatic Artery (with Dr. Ross).
Can. Medical & Surgical Journal, 1877.

- 54
- ✓ XIV. Introductory Address at the Opening of the 47th Session of the Medical Faculty, McGill College.
Can. Medical & Surgical Journal, 1877.
 - ✓ XV. Case of Progressive Pernicious Anæmia (with Dr. Gardner) *Can. Medical & Surgical Journal*, 1877.
 - XVI. Case of Progressive Anæmia (with Dr. Bell).
Transactions of Can. Med. Association, 1877.
 - XVII. Ueber die Beschaffenheit des Blutes und Knochenmarkes in der progressiven perniciosösen Anämie.
Centralblatt f. d. med. Wissenschaften, No. 15, Berlin, 1877.
 - ✓ XVIII. Beschaffenheit des Blutes und Knochenmarkes bei perniciosöser Anämie.
Centralblatt f. d. Med. Wissenschaften, No. 28, Berlin, 1877.
 - ✓ XIX. Over-strain of the Heart.
Can. Medical & Surgical Journal, 1878.
 - XX. On the Pathology of Pig-Typhoid.
Veterinary Journal, London, 1878.
 - XXI. Entwicklung von Blutkörperchen im Knochenmark bei perniciosöser Anämie.
Centralblatt f. d. Med. Wissensch, No. 26, Berlin, 1878.
 - XXII. Pathological Report Montreal General Hospital, Vol. I, Montreal, 1878.
 - ✓ XXIII. Croup or Diphtheria, which?
Can. Medical & Surgical Journal, 1879.
 - ✓ XXIV. Case of Obliteration of Inferior Vena Cava.
Journal of Anatomy & Physiology, London, 1879.
 - ✓ XXV. Case of Congenital and Progressive Hypertrophy of Right upper Extremity.
Journal of Anatomy & Physiology, London, 1879.
 - ✓ XXVI. Two cases of Striated Myo-Sarcoma of Kidney.
Journal of Anatomy & Physiology, 1880.
 - ✓ XXVII. Cases of Cardiac Abnormalities (two plates).
Montreal Gen. Hosp. Reports, Vol. I, 1880.

- ✓ XXVIII. On the condition of Fusion of two segments of the Semilunar Valves (with plate).
Montreal Gen. Hosp. Reports, Vol. I, 1880.
- ✓ XXIX. Pathological Report, Montreal General Hospital, No. II.
With the Reports, Vol. I, 1880.
- ✓ " XXX. On the Systolic brain murmur of Children.
Boston Med. & Surg. Journal, 1880.
- ✓ XXXI. Cases of Insular Sclerosis.
Can. Medical & Surgical Journal, 1880.
- ✓ XXXII. On delayed Resolution in Pneumonia.
Canada Lancet, 1880.
- ✓ XXXIII. On heredity in progressive Muscular Atrophy as illustrated by the Farr Family.
Archives of Medicine, Vol. IV., New York, 1881.
- XXXIV. On a remarkable Heart-murmur, heard at a distance from the chest-wall.
Med. Times & Gazette, London, 1880.
- ✓ XXXV. On a case of Medullary Neuroma of Brain (with plate).
Journal of Anatomy & Physiology, London, 1881.
- ✓ XXXVI. Infections, so called, Ulcerative Endocarditis (with plate).
Archives of Medicine, Vol. V., 1881, N.Y.
- XXXVII. Cases of Hodgkin's Disease.
Can. Medical & Surgical Journal, 1881.
- ✓ XXXIX. Clinical Lecture on Idiopathic or Pernicious Anæmia.
Can. Journal of Med. Science, 1881.
- ✓ XL. Clinical Lecture on Fibroid Phthisis.
Can. Medical & Surgical Journal, 1881.
- ✓ XLI. On some of the effects of the chronic impaction of Gall Stones, and on the "fièvre intermittente hépatique" of Chareot.
Medical Times & Gazette, London, 1881.
- ✓ XLII. On Renal Cirrhosis, with special reference to its latency, etc.
Canada Lancet, 1881.
- ✓ XLIII. Notes on Intestinal Diverticula.
Annals of Anatomy & Surgery, Vol. IV., Brooklyn, 1881.

- 80 Hereditary Angio-neurotic edema. Ann. fr. Med. Sciences 1886
- 82 Neurosycome in Epilepsy. fr. N. Y. Mental Diseases Jan 1888
- 83 On the Diagnosis of small-pox. Medical Standard Chicago 24/1/88
- 84 Gummata in the brain. fr. N. Y. Mental Diseases March 1888
- 85 On the treatment of small-pox. Med. News 1888
- 86 On the central paleies of children. Med. News 1888
- 87 Cases of Disease of Cecum & appendix. Med. Standard 1888
- 88 On the treatment of the disease. University Med. Mag. 1888
- 89 Post-partum hemorrhage. Med. Standard 1888
- 90 On the treatment of the disease. American J. Med. Sciences 1889
- 91 On the treatment of the disease. N. Y. Med. Soc. 1888
- 92 On Pachymeningitis hemorrhagica. Med. News 1888
- 93 Lesions of the caudal region. Med. News 1888
- 94 On the form of Purpura rheumatica. N. Y. Med. J. 1888
- 95 On Pharyngitis. Medical News 1889
- 96 The science to Practice - an address. 1889
- 97 On the central paleies of children - a monograph. London Phil. 1889
- 98 Equanimulus - a solidifying address. 1889
- 99 On the treatment of the disease. Med. News 1889
- 100 On the treatment of the disease. Ann. fr. Med. Sc. 1889
- 101 Syphilis of the cord & caudal region. fr. N. Y. Med. J. 1889
- 102 On the treatment of the disease. J. H. H. Bulletin. No. 1 1890
- 103 On the treatment of the disease. 1890
- 104 On the treatment of the disease. 1890
- 105 On the treatment of the disease. 1890
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THE LIQUOR SANGUINIS.

BY
WILLIAM OSLER, M.D.

In many diseased conditions of the body, occasionally also in perfectly healthy individuals and in many of the lower animals, careful investigation of the blood proves that, in addition to the usual elements, there exist pale granular masses, which on closer inspection present a corpuscular appearance (Plate V. fig. 1). There are probably few observers in the habit of examining blood who have not, at some time or other, met with these structures, and have been puzzled for an explanation of their presence and nature.

In size they vary greatly, from half or quarter that of a white blood-corpuscle, to enormous masses occupying a large area of the field or even stretching completely across it. They usually assume a somewhat round or oval form, but may be elongated and narrow, or, from the existence of numerous projections, offer a very irregular outline. They have a compact solid look, and by focusing are seen to possess considerable depth; while in specimens examined without any reagents the filaments of fibrin adhere to them, and, entangled in their interior, white corpuscles are not unfrequently met with.

It is not from every mass that a judgment can be formed of their true nature, as the larger, more closely arranged ones have rather the appearance of a granular body, and it is with difficulty that the individual elements can be focused. When, however, the more loosely composed ones are chosen, their intimate composition can be studied to advantage, especially at the borders, where only a single layer of corpuscles may exist; and when examined with a high power (9 or 10 Hartnack) these corpuscles are seen to be pale round disks, devoid of granules and with well-defined contours. Some of the corpuscles generally float free in the fluid about the mass; and if they turn half over their profile view has the appearance of a sharp dark line (fig. 5, *a* & *b*). In water the individual corpuscles composing the mass swell greatly; dilute acetic acid renders them more distinct, while dilute potash solutions quickly dissolve them. Measurements give, for the large proportion of the corpuscles, a diameter ranging from one 8000th to one 10,000th of an inch; the largest are as much as one 5000th, and the smallest from one 15,000th to one 24,000th of an inch; so that they may be said to be from $\frac{1}{8}$ — $\frac{1}{2}$ the size of a red corpuscle. In the blood of cats, rabbits, dogs, guineapigs, and rats the masses are to be found in variable numbers. New-born rats are specially to be recommended as objects of study, as in their blood the masses are commonly both numerous and large. They occur also in the blood of fœtal kittens.

Considering their prevalence in disease and among some of the lower animals, they have attracted but little notice, and possess a comparatively scanty literature. The late Prof. Max Schultze* was the first, as far as I can ascertain, to describe and figure the masses in question. He speaks of them as constant constituents of the blood of healthy individuals, but concludes that we know nothing of their origin or destiny, suggesting, however, at the same time that they may arise from the degeneration of granular white corpuscles. Schultze's observations were confined to the blood of healthy persons, and he seemed of the opinion that no pathological significance was to be attributed to them.

By far the most systematic account is given by Dr. Riess†, in an

* Archiv f. mik. Anat. Bd. i.

† Reichert u. Du Bois-Reymond's Archiv, 1872.

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Wooldridge & Platelets.

Lancet cl. 6., 1858-59.

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Woolf. see B.M.J. 1889 (i) pp 1367 & 1440.

His papers, published abroad, drew no
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them as "Chemistry of the Blood" in 1893.

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* Virchow's Archiv. Bd. xxxiv.

† Wiener med. Presse, 1868, No. 13.

‡ Comptes Rendus, lxxvii. 1054. Quoted in 'Centralblatt,' 1869, p. 96.

§ Centralblatt, 1873, No. 34.

|| Centralblatt, 1873, No. 39.

¶ Virchow's Archiv. Bd. xviii.

500th to one 400th of a line), and speaks of them also as occurring in clumps and groups of globules. It is clear, on reading his account, that in part, at any rate, he refers to the corpuscles above described. Gradations such as he noticed between these and the coloured elements I have never met with, and undoubtedly he was dealing with the latter in a partially decolorized condition. Losterfor's* corpuscles, which attracted such attention a few years ago from the assertion of the discoverer that they were peculiar to the blood of syphilitic patients, require for their production an artificial culture in the moist chamber extending over several days. They appear first after two or three days, or even sooner, as small bright corpuscles, partly at rest, partly in motion, which continue to increase in size, till, by the sixth or seventh day, they have attained the diameter of a red corpuscle, and may possess numerous processes or contain vacuoles in their interior. Blood from healthy individuals, as well as from diseases other than syphilis, has been shown to yield these corpuscles; and the general opinion at present held of them is that they are of an albuminoid nature.

The question at once most naturally arose, How is it possible for such masses, some measuring even one 400th of an inch, to pass through the capillaries, unless supposed to possess a degree of extensibility and elasticity such as their composition hardly warranted attributing to them? Neither Max Schultze nor Riess offer any suggestion on this point, though the latter thinks that they might, under some conditions, produce embolism.

During the examination of a portion of loose connective tissue from the back of a young rat, in a large vein which happened to be in the specimen, these same corpuscles were seen, not, however, aggregated together, but isolated and single among the blood-corpuscles (fig. 8); and repeated observations demonstrated the fact that, in a drop of blood taken from one of these young animals, the corpuscles were always to be found accumulated together; while, on the other hand, in the vessels (whether veins, arteries, or capillaries) of the same rat they were always present as separate elements, showing no tendency to adhere to one another. The masses, then, are formed at the moment of the withdrawal of the blood, from corpuscles previously circulating free in it.

To proceed now to the main subject of my communication. If a drop of blood containing these masses is mixed on a slide with an equal quantity of saline solution, $\frac{1}{2}$ – $\frac{3}{4}$ per cent., or, better still, perfectly fresh serum, covered, surrounded with oil, and kept at a temperature of about 37° C., a remarkable change begins in the masses. If one of the latter is chosen for observation, and its outline carefully noted, it is seen, at first, that the edge presents a tolerably uniform appearance, a few filaments of

* Wiener med. Presse, 1872, p. 93. Wiener med. Wochenschrift, 1872, No. 8. Article in Archiv f. Dermatolog. 1872.

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fibrin perhaps adhering to it, or a few small corpuscles lying free in the vicinity. These latter soon exhibit apparent Brownian movements, frequently turning half over, and showing their dark rod-like border (fig. 5, *a, b*). After a short time an alteration is noticed in the presence of fine projections from the margins of the mass, which may be either perfectly straight, or each may present an oval swelling at the free or attached end or else in the middle (fig. 2, *b*). It is further seen that the edges of the mass are now less dense, more loosely arranged, or, if small, it may have a radiated aspect. Sometimes, before any filaments are seen, a loosening takes place in the periphery of the mass, and among these semifree corpuscles the first development occurs. The projecting filaments above mentioned soon begin a wavy motion, and finally break off from the mass, moving away free in the fluid. This process, at first limited, soon becomes more general; the number of filaments which project from the mass increases, and they may be seen not only at the lateral borders, but also, by altering the focus, on the surface of the mass, as dark, sharply defined objects. The detachment of the filaments proceeds rapidly; and in a short time the whole area for some distance from the margins is alive with moving forms (fig. 2, *c*, and fig. 3), which spread themselves more and more peripherally as the development continues in the centre. In addition to the various filaments, swarming granules are present in abundance, and give to the circumference a cloudy aspect, making it difficult to define the individual forms. The mass has now become perceptibly smaller, more granular, its borders indistinct and merged in the swarming cloud about them; but corpuscles are still to be seen in it, as well as free in the field. A variable time is taken to arrive at this stage; usually, however, it takes place within an hour and a half, or even much less. The variety of the forms increases as the development goes on; and whereas, at first, spermatozoon-like or spindle-shaped corpuscles were almost exclusively to be seen, later more irregular forms appear, possessing two, three, or even more tail-like processes of extreme delicacy (fig. 5, *k*). The more active ones wander towards the periphery, pass out of the field, and become lost among the blood-corpuscles. The process reaches its height within $2\frac{1}{2}$ hours, and from this time begins almost imperceptibly to decline; the area about the mass is less densely occupied by the moving forms, and by degrees becomes clearer, till at last, after six or seven hours (often less), scarcely an element is to be seen in the field, and a granular body, in which a few corpuscles yet exist, is all that remains of the mass. The above represents a typical development from a large mass in serum, such as that seen in fig. 3*.

We have next to study more in detail the process of development and the resulting forms. Commonly, the first appearance of activity is

* The mass from which this sketch was taken was seen in full development by several of the foreign visitors to the British Medical Association last year.

displayed by the small free corpuscles at the margins, which, previously quiescent, begin a species of jerky irregular movement, at one time with their pale disk-surfaces uppermost, at another presenting their dark linear profiles (fig. 5, *a* & *b*). Not infrequently, some of these are seen with a larger or smaller segment of their circumference thicker and darker than the other (fig. 5, *c*).

Earliest, and perhaps the most plentiful, of the forms are those of a spermatozoon-like shape (fig. 5, *d*), attached to the mass either by the head or tail; while, simultaneously, long bow-shaped filaments appear (fig. 5, *e*), having an enlargement in the centre. Straight hair-like filaments (fig. 5, *f*) may also be seen, but they are not very numerous. The time which elapses before they begin the wavy movement is very variable, as is also the time when they break away after once beginning it. Filaments may be seen perfectly quiescent for more than half an hour before they move, and others may be observed quite as long in motion before they succeed in breaking away from the mass. Commonly it is in the smaller masses, and where the development is feeble, that filaments remain for any time adherent. The spermatozoon-like forms appear, at the head, on one view flattened and pale, on the other dark and linear (fig. 5, *d*); consequently the head is discoid, not spheroidal. The bow-shaped filaments also present a dark straight aspect when they turn over (fig. 5, *e*), and are by far the longest of the forms, some measuring as much as one 900th of an inch. Many intermediate forms between the round discoid corpuscles and those with long tails are met with in the field, and are figured at fig. 5, *g*.

Small rod-shaped forms are very numerous, most of which, however, on one aspect look corpuscular; but in others this cannot be detected, or only with the greatest difficulty; slight enlargements at each end may also be seen occasionally in these forms (fig. 5, *h*).

Usually late to appear, and more often seen in the profuse developments from large masses, are the forms with three or more tail-like processes attached to a small central body (fig. 5, *k*). Among the granules it is extremely difficult to determine accurately the number of these processes, the apparent number of which may also vary in the different positions assumed by the element. As to the ultimate destiny of the individual forms, I have not much to offer; I have watched single ones, with this view, for several consecutive hours without noticing any material alteration in them. The one represented at fig. 6 was watched for four hours, that at fig. 7 for five, and the changes sketched. The difficulty of blowing up individual filaments in this way is very great, not only from increasing weariness, but from the obstacle the red corpuscles offer to it.

With regard to the movement of the filaments, this, at first sight, bears some resemblance to that known as the Brownian, exhibited by

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granules in the field, or sometimes by the red corpuscles; but an evident difference is soon noticed in the fact that, while the former (also the small corpuscles) undergo a change of place, the latter remain constant in one position or vary but little.

Movements like those of the ordinary rod-shaped *Bacteria* are not exhibited by them.

Circumstances which influence the development.—In blood, without the addition of saline solution or serum, no change takes place in the masses even after prolonged warming. A temperature of about 37° C. is necessary for the process; none occurs at the ordinary temperature, with or without the addition of fluid. Fresh serum is the medium most favourable to the process, added in quantity equal to the amount of blood. Not every mass develops when placed under conditions apparently favourable; but for this no good reason can, at present, be offered.

Fig. 8 represents the corpuscles among the red ones while in the vessel; and, as is there seen, they appear somewhat more elliptical on the profile view, and more elongated, than in blood after withdrawal, but present the same disk-like surfaces when they roll over. On adding saline solution or serum, and warming the preparation, development proceeds, but not to such an extent as from the masses. The individual corpuscles become elongated, some tailed, and they move about in the vessel. At fig. 9 they are seen in the vessel after three hours on the warm stage: the remarkable form seen at *a* was one 1300th of an inch in length, and had moved up from the opposite end of the vessel.

It must still be confessed, with Max Schultze, that we know nothing of the origin or destiny of these corpuscles; and once admit their existence as individual elements circulating in the blood, his suggestion, and Riess's assertion that the masses arise from the disintegration of white corpuscles, becomes quite untenable. We must also confess the same ignorance of the reasons of their increase in disease; nor do we know at all what influence they may exert in the course of chronic affections.

Finally, as there is no evidence that these bodies are in organic continuity with any other recognized animal or vegetable form, or possess the power of reproduction, nothing can at present be said of their nature or of their relation to *Bacteria*.

These observations were carried on in the Physiological Laboratory of University College, and my thanks are due to Prof. Sanderson and Mr. Schäfer for advice and valuable assistance.

EXPLANATION OF THE PLATE.

PLATE V.

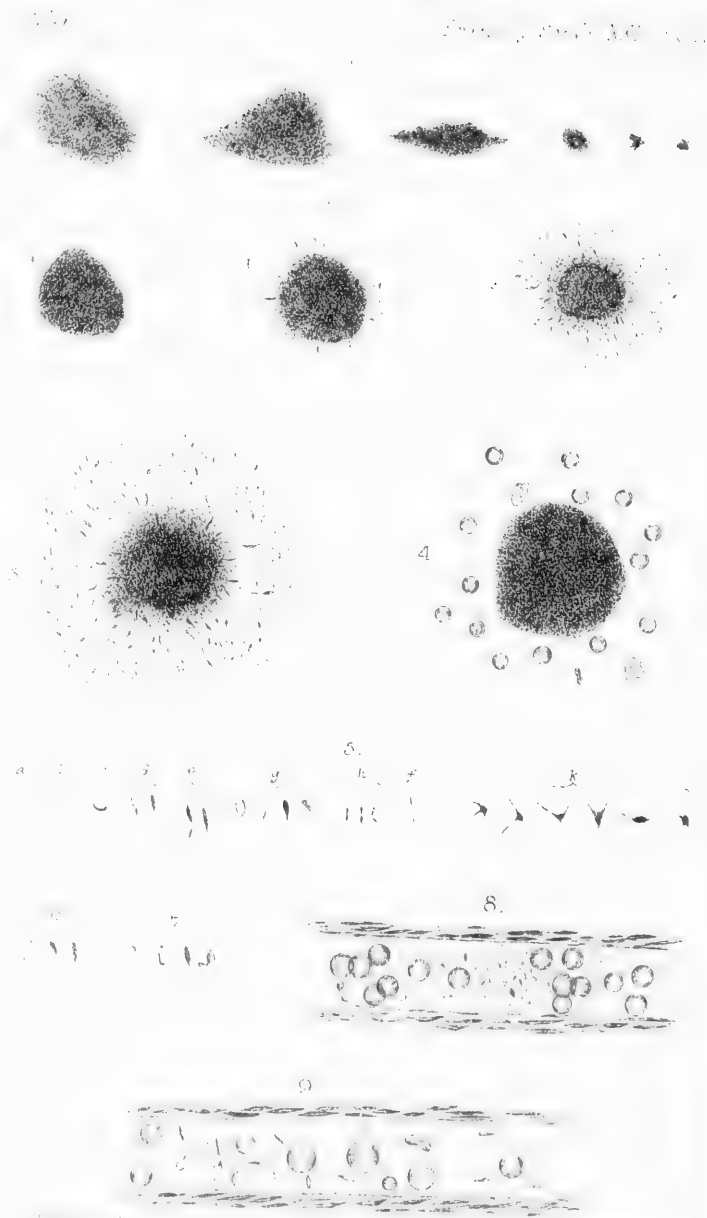
Fig. 1. Common forms of the masses from healthy blood. (Ocular 3, Objective 5.)

Fig. 2. A mass from healthy blood, in saline solution, showing stages of development: *a*, at 10 A.M.; *b*, at 10.30 A.M.; *c*, at 11 A.M. (Ocular 3, Objective 7.)

- Fig. 3. Mass from blood of young rat (in serum) in full development, after two hours' warming. (Ocular 3, Objective 7.)
- Fig. 4. Mass (young rat) with blood-corpuscles about it, to show the relative sizes. (Ocular 3, Objective 5.)
- Fig. 5. Some of the developed forms as seen with No. 11 Hartnack. (See text.)
- Fig. 6. Form watched for four hours. (Ocular 3, Objective 9.)
- Fig. 7. Form watched for five hours. (Ocular 3, Objective 9.)
- Fig. 8. Small vein in connective tissue from the back of a young rat, showing the corpuscles free among the red ones. (Ocular 3, Objective 7.)
- Fig. 9. Small vein from the connective tissue of a rat (in serum), showing corpuscles and developed forms. (Ocular 3, Objective 9.)

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ON THE

PATHOLOGY OF MINER'S LUNG.

By WM. OSLER, M.D.

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(Read before the Medico-Chirurgical Society of Montreal, Aug. 27th.)

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ON THE
PATHOLOGY OF MINER'S LUNG.

BY WILLIAM OSLER, M.D.

Prof. Institutes of Medicine, McGill University.

(Read before the Medico-Chirurgical Society of Montreal.)

Situated as we are, at a considerable distance from mining centres, it is only occasionally that cases of disease resulting from the inhalation of coal dust are brought before our notice. Having lately had such a case, I take this opportunity of laying it before you, together with a hitherto undescribed specimen from the Museum of the College, and also, other specimens illustrating the pathology of lung pigmentation. The man from whom I obtained the lungs of the first case I am about to describe was a powerful, well built Scotchman, 36 years of age, who died under my care in the small-pox department of the General Hospital of Variola maligna, after an illness of five days. Throughout the attack there were no symptoms referable to disease of the lungs; the breathing, it is true, was greatly accelerated, but not more than is usual in cases of hæmorrhagic Small-pox.

Post-mortem examination, four hours after death—On opening the thorax the lungs appeared very full in volume, and instead of collapsing, projected slightly forward. The lower lobe of the right lung was adherent to the pleura in front and laterally by thin, delicate bands, apparently not of old date. Left lung and upper part of right free. No fluid in the pleural cavities. On removal from the chest both lungs presented over their whole surface a uniform, deep blue-black colour; so general was it, that not a trace of the

natural hue of the organ remained. At the apices and in front the colouration was not so intense as in the posterior regions, but here it was exaggerated by the hypostatic congestion existing in these parts. Both lungs were crepitant throughout and floated in water. Cicatrices existed at the apices. Several patches of collapse were noticed along the anterior free margins. Pulmonary pleura somewhat opaque, and thickened to such a degree that even with a lens the air cells could not be seen through it, except at one border where they were much dilated and emphysematous. At spots, probably corresponding to the interlobular septa, the colour was darker than at others. On section the organs presented an intensely black colour, and the serum which flowed from the cut surface was of an inky hue. The posterior lobes were sodden and oedematous, but still crepitant, and floated in water. Here and there throughout the substance small patches of apoplexy—the largest the size of a walnut—could be seen. When squeezed a fluid like ink could be expressed, which left a dark stain upon the hands. Repeated washing of a portion of lung diminished considerably the intensity of the colouration. On the surface of a portion thus treated different shades of pigmentation can be seen. Round or linear patches, ranging in size from a pea to a hazel-nut, of an intensely black colour exist in large dark, slate grey areas. In many of these spots the air cells can still be detected, in others they appear to be obliterated, and the section in this case is uniform, not porous. On careful dissection I was able to demonstrate in nearly every instance that these spots had a small bronchiole penetrating them, and this can be seen in several of the specimens. These patches when excised and placed in water always sank, even when air cells could be seen in them. Many such existed just beneath the pleura and their situation was easily told, not only by the deeper colour at these localities, but, also, by the fact that a slight superficial puckering sometimes existed. To the feel they were also firmer, more solid, than the other parts of the lungs, not so much so,

however, as the apoplectic spots. The portions of lung tissue intervening between these intensely pigmented areas were of a uniform slate grey colour, studded with the hæmorrhages already mentioned. The fluid expressed from these pieces was very dark. The air-cells when examined with a lens appeared almost universally emphysematous, more especially those in the upper and anterior regions of the lungs, occupying a superficial position. Certain limited sections of the lungs, generally situated superficially, appear denser than others, the air cells are visible but very small, and the amount of alveolar tissue in proportion to the air space is abnormally great. This may be due, of course, either to colliapse or to an increase of the fibrous elements in the walls of the air cells. I am inclined to think it due to the latter from examination of the air cells, and also after comparison of it with several genuine patches of collapse, which existed at the anterior free borders. Several small cavities, the largest about the size of a pea, containing air were met with, probably large emphysematous cells, as they were quite devoid of any definite wall, and the air vesicles opened directly into them. The tissues of the larger bronchi preserved their natural colouration, but as they reached their ultimate ramifications, when diminished to the size of a crow-quill, the mucous membrane became of a deep black colour, and the surrounding elements of the walls were very generally pigmented. The bronchi were filled with a frothy mucus, but the mucous membrane was not thickened, nor were there any evidences of chronic bronchitis. The *tunica adventitia* of the blood vessels—large and small—was impregnated with the dark particles and the transverse section of an artery presented three zones of colouration, a dark one corresponding to the *adventitia*, a white fibrous one to the *media*, while the red central zone occupying the lumen of the vessel is made up of the blood corpuscles. The bronchial glands were firm, not enlarged, and presented an excessively black surface on section.

Microscopical examination : first, of the dark coloured

serum, which can be so readily expressed. A variety of cellular elements are here met with, and the colour is seen to depend upon black granules, partly free, and partly inclosed within the cells. A difference would seem to exist in this respect as to whether the drop examined was furnished by one of the darker spots, or from the intervening greyish portions; in the former case there are more free granules, in the latter they are generally inclosed within corpuscles. These carbonaceous particles range in size from almost imperceptible molecules up to portions the 1-12000 of an inch and over. The latter are, as a rule, angular and do not exhibit the Brownian movement. In addition, pieces are occasionally met with of an elongated form, and of a brownish red colour at the edges, or, if thin enough, over the whole mass. Some of these can be seen with the naked eye, and I measured several more than 1-250 of an



inch in length (See fig. 1). Other very peculiar forms were noticed, which, from the regularity of their outlines, I believe to be structures connected in some way with the coal, but upon this point I lack the necessary knowledge to decide. The cellular elements found in the expressed serum may be arranged as follows:—

I. Groups of flat cells each with a distinct nucleus, the boundaries of the cells, in many instances, being ill-defined, or sometimes similar cells are grouped together upon a portion of membrane. Free in the field are others identical with the individual ones composing the above groups. They are about the 1-1200 of an inch in diameter, nucleus large and sharply marked, borders often indistinct, cell substance granular, friable, often broken away in part, leaving the nucleus exposed. The free nuclei of these cells also are present in numbers. Carbon granules are only occasionally met with in these corpuscles, and I think they must be regarded as the original cell elements of the alveoli, and perhaps, to a large extent derivatives of them in a slight catarrhal process.

II. White blood corpuscles, distinguished from the former by their smaller size and less distinct nucleus. They only occasionally contain dark granules.

III. Corpuscles in which the bulk of the carbon is contained, and upon whose presence the black colour of the expressed juice in most instances depends. These are very variable in size, and may, on the one hand, approach the colourless blood corpuscles, and on the other, attain to five or six times their diameter. See figure 2 (*a*).



Fig. 2.

In shape they are usually round, sometimes oval, occasionally irregular, very rarely approaching the spindle form. Inside all of these the carbon particles exist in extraordinary numbers, filling the cells in different degrees. Some are so densely crowded that not a trace of cell substance can be detected, more commonly a rim of protoplasm remains free, or at a spot near the circumference, the nucleus, which in these cells is almost always eccentric, is seen uncovered. The contained carbon particles are, for the most part, angular, and when not too thickly massed together, a reddish brown colour can be observed in each. In a few of them comparatively coarse portions of coal are found imbedded, stretching the cells to their utmost limits. At fig. 2 (*b* and *c*) such cells are represented, and in the latter the corpuscle has evidently accommodated itself to the shape of the piece of coal. One most curious specimen was observed: on an elongated piece of carbon three cells were attached, one at either end, and a third in the middle; so that the whole had a striking resemblance to a dumb-bell. I could hardly credit this at first, until, by touching

the top-cover with a needle and causing the whole to roll over, I quite satisfied myself that the ends of the rod were completely imbedded in the corpuscles, and the middle portion entirely surrounded by another. So strong was the attachment that I failed to separate any of the corpuscles by pressure on the top-cover and other manipulations. Another corpuscle was seen entirely surrounding the end of a small rod, forming a miniature drum stick, the handle of which was twice as long as the diameter of the corpuscle.

IV. Decolourized red blood corpuscles, which are very numerous in all the specimens examined. Many of them are aggregated together into masses, casts, probably, of the air cells pressed out of the apoplectic centres.

V. Amyloid corpuscles, of which a few well-marked specimens were observed.

We come now to the examination of the lung substance itself, and first of the small dark areas. On teasing portions of these, unless done very finely, no structure can be made out, uniformly dark masses present themselves. If, however, the elements are more minutely separated a dense interpenetration by small dark granules of all the textures is observed. We have not here to deal with cellular bodies containing the pigment, for it is free in the interstices of the tissue, and few or no cells can be detected. So thickly is the pigment scattered over the structures, that even an isolated fibril of elastic tissue is with difficulty seen, on account of the granules attached to it. The air cells seem obliterated by the excessive accumulation of pigment and the great increase of the connective tissue, and hardly a trace of them is met with. As before mentioned, the fluid expressed from these parts contains only fine granules with an occasional cell. Thin sections show very well how intense the pigmentation is, but yield very little information as to its distribution, for a uniform black surface is presented, which only here and there in irregular spaces is penetrated by the light. To-

wards the borders, where the tissues are not so densely infiltrated, some of the carbon is seen to be contained within round corpuscles, and also confined in very irregular, somewhat spindle-shaped areas, but whether these latter are connective tissue corpuscles or not is difficult to decide. From their extreme irregularity and the number of their processes it is probable they are not, but only represent the arrangement of the carbon granules among the elements of the tissue. All the coats of both bronchioles and vessels in these areas are impregnated in the same way, but I have not found any of the latter obstructed by accumulations of coal dust.

In passing to the consideration of the histology of the less pigmented and by far the largest section of the lungs, it may be mentioned that a considerable part of the colouration in this is due to carbon granules retained within the cells already described. These exist in abundance throughout the whole substance, and are everywhere present, both in sections and in teased preparations. They are found chiefly in the interstices of the stroma and along the course of the alveolar septa, occasionally, also, lying free in the air cells. Nothing further need be added to the description previously given of them.



Fig. 3. ($\times 450$.)

Secondly, isolated particles of carbon are tolerably numerous, even in situations which, under the microscope, look on superficial examination to be quite free. The membranous walls of the alveoli are constantly seen dotted over with black granules, though it is rare to see any occupying the cells upon it, and in the same way the interstices of the fibrous stroma contain them in abundance. The

manner in which these small particles gain entrance into the stroma may sometimes be observed, as sketched in figure 3, representing the margin of an air cell. Particles of various sizes are there seen, some attached to the free margin, others imbedded in its substance, while others again occupy positions a considerable distance in. A third situation is the point of junction of the fibrous septa, where, in many instances, quite a dense accumulation is met with in the form of fine granules, as is seen at fig. 4.

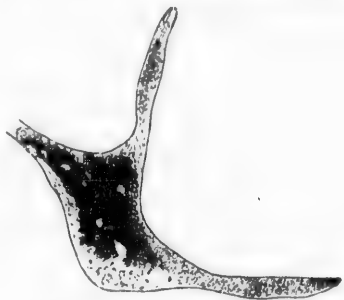


Fig. 4. (x 100.)

A fourth and most favourite locality is the interlobular connective tissue, which cannot be considered apart from that of the vessels and bronchi. Here, as can be seen with the naked eye, the deposit is excessive, and the blood vessels are readily followed as dark, irregular branching lines. The examination of sections of vessels show that in most instances the *adventitia* alone is effected, while the *media* and *intima* remain quite normal. Similarly it is only the loose fibrous coat of the bronchi in which the pigment occurs, though occasionally a transverse section of a bronchiole is seen pigmented throughout.

With regard to the alveoli themselves no very great deviation from the normal structure was noticed, save that in many places an increase in cellular elements, the result of a catarrhal process, had taken place on the membranous wall. In some situations, also, a marked thickening of the

alveolar septa had occurred, which was perceptible to the naked eye and has been already referred to in the description of certain areas in which the air cells were much diminished in volume. This was rendered very evident by comparing specimens taken from these areas with others from a healthy lung, or even from more natural sections of the same one. In one or two localities isolated air cells, or small groups, were found filled with colourless tenacious plugs (very similar to those of croupous Pneumonia), consisting of an extremely delicate fibrillar network enclosing various cellular structures, among which those described under (1) and (3) of the elements found in the expressed serum of the lung were the most numerous. The large ones, filled with carbon granules, in some instances gave a dark tint to these small masses.

The most superficial layer of the pleura, composed of a fibrillar membrane upon which the pavement epithelium lies, can be stripped off as a clear transparent structure quite devoid of pigment. Immediately beneath this, however, there is a fibrous layer densely crowded with carbon granules, both free in the tissues and contained in the large round cells, which latter are very abundant in this situation. Oddly enough, just in teased portions from this sub-pleural region some of the coarsest particles of carbon were obtained.

I have been fortunate enough to procure for examination several other specimens illustrating different degrees of pigmentation in the lungs. The first of these, comprising the lower lobe of one lung, was obtained from a Cornish miner who died under Dr. Howard's care some years ago in the General Hospital of Pneumonia. The notes of the case have unfortunately been mislaid, so that I am unable to state the condition of the other parts of the organ. Superficially, the whole lobe is of an intense blue black colour, due to the accumulation of the carbon beneath the pleura, and this deposition varies in thickness in different parts, in some forming a very thin layer, while in others it has a

diameter of from two to four lines. At one or two places it is absent, one spot especially, near the root, and through these the light coloured portions of the lung can be seen. On section, irregular spots of an exceedingly black colour are seen scattered over a very pale lung substance. The relation between these two areas of colouration is not the same throughout; towards the root and in the portion of the lobe which rests on the diaphragm the dark exceed the light, while in the posterior and lateral regions the reverse holds good. Closer examination shows that the favourite localities for the pigment are about the vessels and bronchi, and the interlobular connective tissue, which can be seen as dark bands stretching from the pleura into the substance. Very many of the dark areas are firm and indurated, presenting a smooth hard surface on section, with occasionally the remains of a bronchus or vessel in the centre; while others of the same pitchy hue are made up of emphysematous air cells with thick hard walls. The portions of the lobe free from pigment look healthy, the air cells are however emphysematous at the margins and beneath the pleura. Many bronchi and vessels are wholly devoid of any pigmentation at their circumference, others of the former have somewhat thickened walls and from several tenacious plugs were extracted.

The bronchial glands, three in number, attached to the root, are firm and of an intensely dark colour.

In the microscopical examination it was found exceedingly difficult to tease up pieces from the dark indurated areas, on account of their extreme hardness and brittleness. They are composed entirely of fibrous and elastic elements, in the interstices of which the carbon granules are so densely arranged that it is only from the margins, where the fibrils project, that any idea of the structure can be obtained. Sometimes, near the borders, or in a less dense portion, a trace of an air cell is found, but as a rule, all remains of them are obliterated by the overgrowth of the fibrous tissue. Very few cellular elements are found in these localities,

and those present are small and do not contain many carbon granules. On the other hand, in and about many of the less indurated areas, the cellular elements are present in abundance, though not so large and more angular in shape than in the former case. This may be accounted for, however, by the fact that this specimen has been in spirit for over ten years, while the other was put while fresh into 1 per cent. solution of potassium bichromate. Cells, large and small, containing coarse particles of carbon or even distinct fragments are numerous. In some instances a process of atrophy, or shrivelling, appears to have gone on in these cells, for elongated portions of carbon were seen enclosed in a contracted mass which bore some resemblance to the remains of a cell; or again, others were imbedded in a yellowish coloured substance with irregular hard outlines as though a deposition of inorganic matter had taken place about them. Free in the field were many small angular black particles, also others much more minute. In this case coarse particles of siliceous matter were quite as common as those of carbon, and in one place an aggregation of 15-20 attached to a piece of lung tissue was noticed. None of these were observed within cells. The dark emphysematous localities, which usually have a small bronchus in immediate connection with them, are composed of a variable number of dilated air cells, all of a jet black colour, and with hard fibrous walls. I dissected out a small spot about the size of a cherry stone containing five emphysematous air cells and teased it up very finely, but was unable to find anything like an alveolar membrane, only fibrous tissue everywhere covered by dark granules. In other regions where the pigmentation was less profuse, definite increase in the fibrous elements in the walls of the air cells can be seen. Instead of the isolated fibres of elastic tissue which in the healthy lung runs across the alveolar wall and serve to strengthen it, we have here in many instances a perfect network. Nor are these to be mistaken with their sharp hard outlines for the collapsed capillary vessels, of which traces in the form

of irregular lines can be seen in normal alevoli. The infiltration of the pleura in this case, also, is limited to the deeper layers, the uppermost—basement membrane and epithelium—remaining free. The bronchial glands are unusually hard and fibrous, and microscopical examination shows an enormous overgrowth of the connective tissue with a corresponding diminution in the cellular elements. The few which are present contain numerous carbon granules.

The third and fourth cases do not properly come under the heading "Miner's lung," but they serve to illustrate several points in connection with the subject, and aid, also, in the understanding of the general pathology of lung pigmentation. The third specimen was obtained, like the second, from the Museum of the College, and of it I have unfortunately a still scantier history. All my information is confined to the brief record on the label, "Melanosis." It is a piece about the size of the fist, representing, I take it, a portion near the apex, and is of a bluish black colour externally. The pleura covering it is thickened, in places white and fibrous, at others intensely dark and fully one-fourth of an inch in thickness. The colouration is very uniform, but on section is seen to be chiefly superficial, extending, however, into the interior in the form of bands, between which the lung tissue retains its natural hue. To the touch the whole mass is firm and indurated. The bronchi are thickened and in some cases surrounded by circles of pigment. Several small caseous masses encapsulated in fibrous tissue, deeply pigmented, occur at the apex. The microscopical examination shows that the pigment is chiefly interspersed as small granules among the fibrous elements of the thickened pleura, and in the bands that pass from it into the lung substance. In the former situation sections demonstrate that the pigment is distributed linearly, often in alternate layers, or interspersed between fasciculi of connective tissue. There is a marked absence of the small angular particles of carbon, and very few pigmented corpuscles were met with.

The fourth specimen is from a man, 65 years of age, who died of Bright's disease in the General Hospital under Dr. Ross, to whom I am indebted for the portions of lung. As far as could be ascertained this man had never been employed in mines, nor in situations where he would have been exposed to a sooty atmosphere. An interesting point in connection with this case is that the pigmentation of the skin was deranged; he presented several large patches of Leucosis.

In the portions of lung given to me for examination, the pleura certainly is abnormally pigmented for a man of his age. In parts the dark colour is almost uniform, but the general arrangement is in round, often irregular shaped spots, which are tolerably closely set over the surface and do not correspond to the interlobular septa. On section they are seen to be quite superficial, in most instances confined to the pleura, though sometimes dipping into the lung substance in the form of bands, or else involving the air cells immediately beneath, in which case, these are invariably emphysematous. The lung substance itself is but little affected, only here and there presenting a dark appearance, due to the accumulation of pigment about the vessels and in the interlobular connective tissue. The dark sub-pleural areas contain a tolerable number of the large cellular elements, but most of the pigment is free among the fibrous tissue. Where the pigmentation extends into the subjacent air cells the septa are dark in colour, and occasionally the alveolar wall was seen to have irregular patches of pigment upon it. Cells containing carbon are also very common in the alveoli, which have been involved in a pneumonic process, and are filled with cellular elements. Sections made parallel to the pleura in these situations show very well how the alveolar septa are covered with pigment, partly free and partly intra-cellular; while the air vesicles are filled with a fine granular substance and cells, many of which contain carbon and are identical with those in the alveolar septa. Small angular particles of carbon are com-

mon in the field, but no coarse ones, like those in cases 1 and 2, were met with. An interesting fact, which will be referred to hereafter with reference to the probable origin of the pigment in this case, is that extravasations of blood were seen in the sub-pleural region, and usually in the vicinity of the dark areas. On several occasions I saw at the edges of small teased portions of an intensely black colour the reddish brown remains of an extravasation. The small pigmented areas in the lungs presented nothing remarkable, they were chiefly in connection with blood vessels.

From the description of the two first cases it is evident that we have here to deal with the early stage of the disease known as Miner's Lung, or, to give it the scientific appellation, Anthracosis. I say the early stage, meaning that the degenerative process can hardly be said to have commenced, and had not these men died of intercurrent affections, they might have lived for years under favorable hygienic conditions. No doubt, however, the point had been reached where further exposure to the impure air of the mines could only have resulted in bringing about serious lung trouble. Ultimately, as the records of *post mortems* show, there arise extensive areas of consolidation—carbonaceous Pneumonia, as it is called,—with numerous cavities containing an inky coloured fluid, and at last death takes place with many of the symptoms of chronic Phthisis, a peculiarity in some cases being the expectoration of a dark colored mucus. In the cases under consideration the intensely black, consolidated spots may be regarded as the first step in a series of degenerative changes. Such general infiltration of the tissues by a foreign matter cannot be without a strongly irritating action, the final effect of which would be a proliferation of the epithelial and connective tissue elements, with the result of obliterating the air cells and the formation of firm indurated areas. The larger these become, the more the cellular elements participate in the process, so much the more likely will they be to soften at the centres, and finally form cavities. The indurated spots

in our specimens were remarkable by the absence of corpuscular elements, and the same would probably hold good in larger areas; still, even in these, as occurs in Cirrhosis of the lungs, a molecular degeneration goes on in the centre, with the formation of a cavity. In the lungs of all individuals who die of this disease these cavities, which are no doubt often bronchiectatic, are described, surrounded by indurated areas, while the comparatively healthy sections are intensely black and emphysematous. Several cases I find recorded of miners having died of intercurrent affections, in whom the lungs presented an appearance similar to what has been described, viz: uniformly dark in color, but with patches of variable size of a much more intense hue, the lung texture itself being healthy, or a little emphysematous. In some instances the continual inhalation of the dust in mines would appear to produce very little effect, for cases are mentioned of miners exposed for years to the same influences to which others succumb, and yet who were but slightly affected. Predisposition to lung disease is an important factor here, and it has been found that where this exists, they die at a much earlier age than those without this hereditary weakness; which need not, however, necessarily be a true tubercular diathesis. Indeed, in reading over the records of the *post mortems* in this disease, one is struck by the absence of any mention either of true tubercles or caseous masses, and in neither of the cases before us do these elements occur. It was suggested by Dr. Wilson Fox, at a discussion on this subject at the Pathological Society a few years ago, that exposure to the irritating substances in the air of the mines might directly induce the production of tubercles, and that the fibroid masses represented the final change which these had undergone. Against any such view the cases here recorded speak strongly. There is nothing in these lungs which would be called a tubercle by a follower of Lænnec or of Virchow, and yet, if the process was one in any way connected with tuberculosis, we should expect just in this early stage to find traces of it;

but instead, we find at the outset of the disease what is spoken of as occurring at the close, fibroid consolidation; the difference consisting in the extent to which it has gone, and in the absence in the former of secondary changes. In its essence the whole disease would appear to consist in an overgrowth—a hyperplasia—of the fibrous tissue of the lungs, induced by the chronic irritation to which they are subjected by the inspired particles of coal dust, a veritable Cirrhosis, or, as it might appropriately be called, the black Cirrhosis of miners. This certainly is the most natural view to be taken of these two cases, and accords best with their general and histological characters. From the fact that in many instances small bronchioles are seen in connection with the fibroid masses we may infer that about them the process begins, and spreads to the surrounding alveoli. In other places the *adventitia* of the blood vessels, and the interlobular connective tissue furnish starting points. We are still in the dark as to how all this takes place, how the air cells become converted into firm, hard areas—fibroid substitution as Dr. Bastian calls it,—or why, again, in the same lung, some of the intensely dark spots are solid, while others are emphysematous.

Before referring to the other specimens, which do not, I believe, come in the same class, a few words must be said upon the general subject of lung pigmentation. Briefly, two sources must be admitted, an internal and an external; in the former, the pigment is transformed hæmatin, and the affection is termed *Melanism*; in the latter it is inhaled carbon, and the resulting disease is *Anthraxosis*. It is only within the last ten or fifteen years that unanimity has been reached on this point. Up to this time many of the leading German and French pathologists refused to recognize the latter source. Even Virchow as late as 1859, basing his observations on portions of miner's lung sent him from Edinburgh, came to the conclusion, though he describes angular particles of carbon from the same cases, that a transformation of the colouring matter of the blood

in repeated small hæmorrhages would account for the whole pigment. The English observers (and with them several French), one and all, as far as my reading goes, from Pearson, who in 1813 first described the affection, took a more practical and common sense view, and attributed to it solely an extraneous origin. Having many more opportunities of observing the conditions under which miners worked, and knowing the foul, sooty atmosphere of the mines, they were led to connect cause and effect, the dust with the disease, and so arrived at the truth years before the Germans, to whom, however, the credit is due of having placed the fact upon an histological and experimental basis. They demonstrated the presence of dotted cells and other structures characteristic of vegetable tissue in the coarser particles obtained from the lungs, and, also, proved that the lungs of animals might be made of a dark color by exposing them for a length of time to a sooty atmosphere. I have been fortunate, also, in these cases to obtain positive evidence of the external origin of the pigment. At fig. 5 a portion of coal is represented which



Fig. 5. (x 300.)

Fig. 6.

exhibits the characteristic appearance of scalariform tissue. This was a very thin flake with distinct cross bars, three of which occupied the whole breadth of the piece, while one other is less evident. The thin spots between the bars were of a brownish red colour. By manipulating I managed to break it across just below the third bar, and was then able to obtain the transverse section, which is given at

fig. 5 (*b*), and makes it more than probable that this was a portion of a scalariform duct rendered prismatic by pressure, a common structure in ferns, and also plentiful in cannel-coal. Another piece, seen at fig. 6, with two round holes, represents a portion of a dotted cell of fir wood.

To consider now this subject of Anthracosis more closely, and endeavour to obtain an insight into its rationale. A comparison of the lungs of a child with those of an adult, or, better still, of an old man, shows that the natural colouration of these organs undergoes a change as age advances, the rosy tint of childhood giving way to a marbled slate-grey, interspersed with patches or lines of an intensely dark colour. Similarly the lungs of an animal present a marked contrast to those of an adult man; and there can be no doubt whatever that in great measure this change in colouration depends upon the inhalation by him of the products of imperfect combustion of fuel of various sorts, gas, &c. This has been called physiological Anthracosis, in contradistinction to the more extreme condition met with among those who work in mines, and other situations in which the air is charged with soot and coal dust. Against the entrance of these noxious matters into the lungs the nasal orifices are furnished with numerous hairs, which, together with the mucus of these passages, retain a considerable quantity of the dust and coarser particles met with in the air. After a lengthened sojourn in a smoky atmosphere how common it is to see the nasal secretion quite black upon the handkerchief. Still, even if the particles escape retention at the orifice, as they all do when the breathing is carried on *per os*, a further provision is made for their expulsion when they reach the bronchial membrane, the cilia of which are in constant motion, producing currents which set externally, and slowly and surely convey the mucus with the contained granules towards the larynx, whence they are readily coughed up. In ordinary inspiration the volume of tidal air does not probably reach further than the larger bronchi, and the coarser particles in this

case, if they reach the alveoli at all do so by the force of gravity ; but in the stronger respiratory efforts, just such as miners by the very nature of their work must constantly make, many attain this situation, and, as here no provision is found for their expulsion, nature provides that they shall at any rate be placed in less injurious localities. In what way this is effected, how the small angular particles which can be seen on the alveolar walls penetrate into the interior, has not yet I believe received a satisfactory explanation. Sharp, angular bodies are said to have a habit of working into soft textures, especially if there is any impelling force, however slight, behind ; but what of the infinitesimal particles that we find throughout these lungs, can the same apply to them ? Certain it is, however, that once fixed in the alveolar wall they resist all attempts at removal, and they may be seen, as at Fig. 2, in all stages of progress towards the interior. In their further distribution they follow exactly the course of the lymphatics, and the tissues in their immediate vicinity ; where these are most abundant there the pigment is in the greatest quantity, as about the connective tissue of the vessels and bronchi, the interlobular septa, and, above all, just beneath the pleura. Once inside the lymphatic vessels a large proportion of the granules is carried on to the glands at the root of the lung, and is there permanently fixed in the cellular elements, hence the intensely dark colour of these in most persons over fifty. This fixation of the carbon granules in cellular bodies is very remarkable, and must be regarded as an effort of the economy to render harmless what might otherwise be very irritating substances. In the greater part of the lungs in the first case the pigment was contained within large cellular elements, belonging to the amœboid class of connective tissue corpuscles, and in the other cases they were by no means uncommon. These were unusually large, twice or three times the size of the colourless blood corpuscles, and very abundant, as if the supply had been equal to the demand. This pathological infiltration of corpuscles

with carbon appears to interfere just as little with the performance of their functions as does the physiological, so common to many connective tissue corpuscles of man and the lower animals ; for in the air cells which had been involved in a pneumonic process, and among the epithelial elements with which they were filled, these same large corpuscles occurred, evidently having migrated from the surrounding tissues, in which sections demonstrate them to be plentiful. To show the remarkable aptitude of cells to take up granules of various sorts, and, also, to demonstrate the rapidity with which the lymphatic glands are affected, I performed several simple experiments, of which I shall mention two :—

Experiment I.—Into the axilla of a two days' old kitten miii. of a strong solution of Indian ink were injected, and into the right lung of the same animal a similar quantity was injected through the pleura. The kitten was killed twenty hours after and the parts carefully examined. In the axilla there was a spot the size of a marble of a dark black colour, composed chiefly of connective tissue and fat. On examination of teased portions it was seen that the particles of Indian ink were either free in the interstices of the tissue, or else contained within the numerous leucocytes, white blood corpuscles, with which the tissue was inundated. These were specially abundant along the course of the puncture, and in this situation all the leucocytes were loaded with the dark granules. The spindle shaped connective tissue corpuscles did not contain any.

On removing the sternum a dark lymphatic gland was seen, and close to it a much smaller one. Nearer the manubrium was another black spot, apparently only an aggregation of dark granules. Where the point of the syringe had penetrated the thorax the layers of the pleura were united by a dark round band about two lines in diameter. Under the dark spot on the pulmonary pleura was a portion of inflamed lung substance the size of a large pea of a dark red colour. Examination of the dark spots on the pleura

and the intervening band showed tissues everywhere infiltrated with small and large cellular elements, in which the bulk of the pigment was held. The small corpuscles in appearance and size correspond to colourless blood corpuscles, which modern pathology has demonstrated leave the vessels in large numbers in the early stage of inflammation. Among these some were sparsely, others densely, crowded with dark granules. The larger cells were more than twice the size of the ones just described, and belong to the group of connective tissue corpuscles. Many were rounded or oval in outline, and these contained the greatest number of granules, while elongated, spindle shaped ones rarely contained any. Changes in outline, amoeboid movements, were seen in most of these corpuscles. In a portion of the pulmonary pleura which was under the microscope a small net work of lymphatic vessels was rendered beautifully clear by the number of dark granules inside them. Unfortunately I was unable to sketch it, as on changing the object-glass for the purpose I accidentally let it fall upon the slide and damaged it for any further use. The curious phenomenon was seen in teased portions of the inflamed lung of cells containing red blood corpuscles. A considerable number of these were met having from six to ten corpuscles in their interior, others presented only a diffuse colouration.

Experiment V.—Into the right thorax of a four weeks' old kitten *m x* of a solution of Indian ink were injected, and the animal killed thirty-six hours after. A dark spot on the costal pleura corresponded to the point of entrance of the needle, but the layers of the pleura were not adherent. The lower lobe of the right lung presented a dark firm mass, about the size of a walnut, occupying its interior, and scattered round it were several other small dark spots involving both pleura and lung substance. The sub-sternal glands were slightly coloured, and those at the bifurcation of the trachea were dark superficially. Examination of the dark mass in the lung showed the air cells in a condition of inflammation, and everywhere crowded with leucocytes, in-

side which almost all the Indian ink granules were contained. So numerous were these cells that even in very thin sections hardly anything else could be seen. At the margins of the healthy and inflamed portions larger corpuscles occurred, which were also filled with the dark granules, and a few were noticed containing red blood corpuscles. The lymph corpuscles of the glands, sub-sternal and bronchial, especially in the superficial region, contained numerous pigment granules.

These experiments serve to show how quickly irritating materials are taken up by cellular elements; and it is in precisely the same way that the carbon granules which reach the parenchyma of the lungs are fixed in the connective tissue corpuscles and so rendered harmless. In experiments 2, 3, and 4 the substernal glands were also more affected than the bronchial, as in these cases the pigment was chiefly about the pleura, and adhesions having taken place between the layers, the lymph bearing the Indian ink granules was conveyed in the vessels of the parietal layer to the glands under the sternum.

In cases three and four the pigmentation is not so extensive, and there is not the same certainty as to its source. In the absence of any history it is hard to say whether in the former case we have to deal with a condition produced by the inhalation of dust, or whether it is an excessively pigmented piece from an old man with chronic lung affection. The general firmness of the piece, the thickened pleura, the existence of caseous masses, and the absence on microscopical examination of large particles of carbon favour the latter view; and if so, the pigment is to a large extent melanotic, i.e., proceeds from the hematin of the blood. Of course in all these cases a double origin may usually be attributed, for the process of physiological Anthracosis goes on constantly, whether there be disease in the lungs or not; but we have learned to regard the pigmentations occurring in the indurated areas about cavities or caseous masses as specially of blood origin, in as much as they are met with

in young children, in whom an Anthracosis is out of the question, and, also, because the extravasations are found in all stages of transformation from yellow up to a jet black. In the last case I think there is still less room for doubt. Here the irregular distribution of the pigment in circular patches, not following the interlobular septa beneath the pleura, to which situation it was in great part confined, a situation, moreover, shown by Virchow to be specially prone to extravasations, but, above all, the detection of extravasations in and about some of the pigmented areas, make it tolerably certain that this is a melanotic process. Whether this had any connection or not with the derangement of pigmentation in the skin, as was suggested, may be questioned. Melanosis as it ordinarily occurs is a very different thing from the physiological process of pigmentation. For the former to take place there must be either long continued congestion, amounting almost to stagnation, or else extravasation, under which circumstances the colouring matter of the corpuscles infiltrates the tissues, and there gradually undergoes a granular precipitation, forming the little particles known as melanin. If in a tissue containing cellular elements the work of the hæmatin finds its way into them, it may occur in them only; but if the extravasation takes place in the region of a fibrous tissue, like these indurated areas in the lungs, the colouring matter passes by imbibition among the various elements, and we find it there as a granular precipitate.

In the normal process, as it goes on for example in the *rete mucosum*, the cells obtain colouring matter from the nutritive plasma, without any stagnation or rupture of vessels. One pathological condition, met with in the pigmented Sarcomas, adheres to the physiological method, for the cells of these derive their pigment, in great part, from the plasma irrigating the tissue, but according to some observers, also from small capillary hæmorrhages.

It is interesting in this connection to refer to the corpuscles containing red blood corpuscles which were found

in the lungs of several of the kittens experimented upon. Here we have to do with an intravasation, or rather an ingestion of the coloured corpuscles within others. Many deny this, but as far as my observation goes there can be no doubt of the fact. In these corpuscles as many as six to ten were seen, in others again the outlines of the red corpuscles could not be detected, as if the cells had absorbed only the colouring matter. Nuclei and granular protoplasm were also seen—strange constituents, if, as some suppose, the appearance of a cell is caused by the separation of the fibrin round a group of red corpuscles. I have sketches in my possession of amœboid cells from newt's blood crowded with blood corpuscles of the guinea-pig, which were abundant in the serum with which the newt's blood was mixed for examination; and it is not at all unlikely that other amœboid cells, even in the tissues, should do the same thing. This is not a common way for cells to become pigmented, but there can be no doubt that these would rapidly have become so, and would then have been undistinguishable from many of the larger corpuscles containing Indian ink granules. To sum up—

I. The histological examination of these two specimens of miner's lung favours the view that in the early stage the process is confined to an increase in the fibrous elements about the bronchioles and vessels, and in certain emphysematous areas—a genuine Cirrhosis, or, as some would prefer to call it, an interstitial Pneumonia.

II. A considerable proportion of the carbon is contained in large cellular elements, which are specially abundant in the less pigmented, healthy portions, and in these it probably remains without much injury to the lung parenchyma. Another large part of the pigment lies free among the elements of the tissues, this being specially the case in the indurated spots, in the thickened pleura, and at the junction of the alveolar septa.

III. The extraneous origin of the carbon is proved by the detection in the lung of portions of fossilized vegetable tissue in the form of scalariform and dotted ducts.

VALEDICTORY ADDRESS

TO THE

Graduates in Medicine and Surgery,

MCGILL UNIVERSITY.

DELIVERED ON BEHALF OF THE MEDICAL FACULTY AT THE
ANNUAL CONVOCATION HELD IN THE WILLIAM MOLSON
HALL OF THE UNIVERSITY, ON WEDNESDAY,
THE 31ST MARCH, 1875.

BY WILLIAM OSLER, M.D., L.R.C.P.L.,

LECTURER ON INSTITUTIONS OF MEDICINE.

(From the *Canada Medical and Surgical Journal*.)

GENTLEMEN OF THE GRADUATING CLASS.—The pleasant duty devolves upon me of offering you, on behalf of the Faculty of Medicine, congratulations on your present success, and good wishes for the future. For four years you have been occupied in mastering the elements of your Profession in the Lecture room, Hospital ward, and Dispensary; and now, having satisfied the requirements of the University, the long looked for degree has been conferred, the coveted title obtained. The time has arrived for you to put in practice what has been taught you here, and your success will depend, in great measure, upon how you have taken advantage of the opportunities afforded at this school.

At the outset it is necessary for you to bear in mind that your professional education is by no means complete; you have, as it were, only laid the foundation, and, let me say, Gentlemen, while it is to be hoped that a good and promising foundation has been laid under the guidance and instruction of others, it rests with yourselves what the superstructure shall be. The credit of your College, the honour of that Profession to which it is our privilege and pleasure to belong, your advancement in life depend on the course you now mark out and follow for yourselves. You must not be content to rest on your oars. The canons of the church, the formulas of the law, are to a certain extent unalterable, are stereotyped. Not so medicine. It is preëminently a progressive science, day by day receiving fresh acquisitions, opening up new fields for investigation, and it will be your duty, as far as in you lies, to keep pace with this progress. During the first few years, while waiting for practice, you will have ample leisure to work up more thoroughly the various branches of your Profession, and keep posted in the latest medical literature. Cultivate in these early years

studious habits. It happens too frequently that after the severe work of the final session, books are thrown aside, and rarely reopened. A glance at the bookshelves of any professional man—Cleric, Lawyer or Physician, will enable you to judge better than anything else, the estimate he has formed of his calling. Let it be also an ambition to add your mite to the store of medical knowledge. Every one can do something; and the routine of general practice affords many cases worth reporting or commenting upon. Our Medical Journals greatly need the coöperation of the profession throughout the country, and in thus recording your experiences you will benefit yourselves, and help to raise the standard of Canadian Medicine. Hitherto, Gentlemen, your relations have been chiefly with your teachers and with each other; now these relations are changed, and you will have to deal in the future with patients and fellow practitioners. On the first point it would not become me to say much. Remember, however, that every patient upon whom you wait will examine you critically and form an estimate of you by the way in which you conduct yourself at the bedside. Skill and nicety in manipulation, whether in the simple act of feeling the pulse, or in the performance of any minor operation will do more towards establishing confidence in you, than a string of Diplomas, or the reputation of extensive Hospital experience. Formerly, in the days of apprenticeship, the medical student was brought daily in contact with patients of all classes, now it is too often the case that Hospital practice is the only variety seen, and the sudden change to private practice is found rather trying. Time soon remedies this, and every case successfully treated adds to the confidence you feel in your own powers. Fortunately, the first patients are among the poor, who are less exacting, more easily pleased, and more disposed to make allowances for a young practitioner than the upper classes. You have of course entered the Profession of Medicine with a view of obtaining a livelihood; but in dealing with your patients let this always be a secondary consideration. It has been well said, "No one should approach the temple of science with the soul of a money-changer." Let the spirit of our Medical moralist, Sir Thomas Browne, whose *Religio Medici* I would commend to your perusal, actuate you. He says "Let me be sick myself, if sometimes the malady of my patient be not a disease unto me; I desire rather to cure his infirmities than my own necessities; where I do him no good methinks it is scarce honest gain, though, I confess, 'tis but the worthy salary of our well intended endeavours." Upon your relations to fellow-practitioners, allow me to offer you a few

words of counsel. It is a fact well known to you all that the great opprobrium of our Profession, especially in the small towns, is the constant rivalry and distrust of one another displayed by its members. That men whose high calling ought to bind them closely together, and whose interests are so much in common, should thus disagree, is a matter deeply to be regretted ; and, I would urge upon you, during your, let me hope, prosperous career, to do all that may lie in your power to remove this scandal from our midst. A little watchfulness when commencing practice may prevent it entirely in your own circle, and you may thus have your brother practitioners as friends not enemies. The evil, I regret to say, is generally traceable to the patients. You will not be engaged in practice many weeks before one seeks you who has been under the care of some other medical man. He or she gives you a statement of the case, blames the former attendant, and expects you to sympathize and add your measure of censure. If you do, it gets talked of, and sooner or later reaching the ears of your rival practitioner forms the nucleus of a serious quarrel. Make it a rule always to discourage the tale of a patient about another medical man ; and even when you think he has made a mistake, be slow to judge. Often too you may feel aggrieved, and think yourself wronged or slighted ; instead of giving vent to your feelings, on such occasions, restrain them, and remember the injunction " If thy brother trespass against thee ; go and tell him his fault between thee and him alone ; if he shall hear thee, thou hast gained thy brother."

A word now on the Temperance question, which is becoming an all important one in Canada for us as medical men. That alcohol is a medicine, and a valuable one, nobody not blinded by prejudice denies ; but bear in mind that it is a dangerous remedy, and one that should not be, as it is, so generally recommended by practitioners.

There are many conditions, for which alcohol is now freely prescribed, quite amenable to treatment by other medicinal agents combined with a careful regulation of diet. When you do order it, give positive directions about the quantity, and the length of time it is to be continued. Inattention to these matters, especially in patients suffering from any of the neuroses, is occasionally the starting point of dangerous drinking habits. Medical men, more than any other, have opportunities of observing the commencement of such habits, and care should be exercised, lest this tendency be fostered by the form of treatment employed. No class of individuals can better wage war against the indiscriminate drinking habits of the public than the Doctors, and the laity will hearken to their admonitions on this point ;

even when the exhortations of the Divines are treated with contempt. Example, Gentlemen, is better than precept, and by becoming teetotallers yourselves, you will neither injure your health nor damage your professional prospects. Too many valuable lives in our Profession are sacrificed yearly to intemperance; and, now is the time for you, with minds still wax to receive and marble to retain," to lay the foundation of good sober habits.

Those of you from Ontario, and intending to practice there, will, I suppose, present yourselves to the Medical Council for examination. This much abused institution is, I believe, doing good service to the Profession of that province, and it is to be regretted that such an examining body does not exist for the Dominion. In a country like this where the power of granting degrees in Medicine is possessed by all the sectarian Universities, it is but just that the profession at large, should have some guarantee of the proficiency of the graduates; and this they can only obtain by combining together, as in Ontario, and examining every man for his license. The examinations are thorough, conducted with fairness, and such as no McGill man who has attended to his studies need fear. Just as Edinburgh men sometimes fail at the Primary and Final Examinations before the Royal College of Surgeons, so occasionally will men from the Universities of Canada be rejected at the Ontario board. As an independent examining body it may yet do much towards elevating the standard of Canadian medicine by making the necessary qualifications of a higher order than they are at present. Hitherto it has not afforded much protection against illegal practitioners, but now, as the finances are in a better condition, the Council is prepared to take action, and intends to prosecute unlicensed men. One hears the assertion not unfrequently made that the existence of the Board is prejudicial to the interests of our Medical school, as it hinders Ontario students from coming here. I do not see how this can be the case. The Ontario student, whether he attends the Toronto schools or McGill, has the same examinations to pass, one before his University, the other before the Board. It entails an additional expense, and it is this, not the examinations with which all the students find fault.

In conclusion, gentlemen, let us hope, that wherever you go, you will maintain the good name of your Alma Mater, and add to the lustre which already surrounds her. Bend all your energies to the attainment of proficiency in your calling; work while it is yet day, that when your night comes it may be said of you as of Gerard de Narbon, one of Shakespeare's Physicians,"

"He was in what he did profess, well found."

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UNTIL ELEVEN A. M.

Church Street 200 W Monument Street.

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2	On Peritoneal Tuberculosis	49	
3	On the initial Rashes of Smallpox	15	rof.
4	On haemorrhage in small - ex.	15	
5	On aneurism of the hepatic	62	eks
6	On Obstruction of the Inf. v. can.	12	only
7	On Furuncle of the umbilical segment	12	leg.
8	On Natural nodes; cure in suppuration	15	the
9	On Schistococcus bacillus in America	10	ing
10	On the morbid anatomy of Pneum.	15	and
11	On the morbid anatomy of Typhoid fever	20	ed.
12	On the haematuria of renal origin	30	ags.
13	On Obstruction of the Portal vein	15	no
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CANADA MEDICAL & SURGICAL JOURNAL.

ORIGINAL COMMUNICATIONS.

Case of Scarlatina miliaris. By WM. OSLER, M.D., Prof.
Institutes of Medicine, McGill College.

C. S., æt. 9, had been convalescent for over two weeks from a moderately severe attack of small-pox, and was only remaining in hospital on account of two ulcers in the leg. During the night of the 30th of June she sat up with the nurse till 4 A.M. watching a dying child, and as on getting up at 7 A.M. she complained of a few pains in her back, and looked very pale and unwell the nurse sent her back to bed. She was not sick at the stomach, nor had she any shiverings. Up to this time she had been doing very well, and no change had been noticed in her health. About 9 A.M., the nurse observed that she had become of a bright scarlet color. At the visit, at 4.45 P.M., there was intense hyperæmia of the skin, the whole surface being of a brilliant red colour, and on touching gave the impression of pungent heat. The redness was diffuse and uniform, only here and there, on close examination, a punctiform character was observed.

Throat not sore; tongue thickly coated; pulse 140; temp. 101.

July 2nd. 8.45 A.M. Had a tolerable night. Pulse 136; temp. 104. Tongue coated. Eruption remains, being even more intense, and some additional features of interest added. Thickly scattered over the whole trunk, upper extremities and thighs, are small miliary vesicles about the size of No. 4 shot, tolerably firm to the touch, and filled with a yellowish creamy fluid. Over the nape of the neck and back they are so closely set that hardly any

intervening skin can be seen. On the dark brown cicatrices left by the varioles they exist in groups. On the arms they are not so numerous, but on the extensor surfaces, especially about the elbowjoint some of them have coalesced to form large bullæ, which are filled with the same yellowish-white matter. Only a few of the vesicles are evident on the legs, but on close inspection small, clear, subcuticular papules are seen, like the vesicles in an early stage of development. Legs and feet are somewhat swollen.

5.30. P.M.—Pulse 148; temp. 102.4. Tongue very much coated. Bowels opened once freely. Feels heavy and is not disposed to take much nourishment. Face suffused, but general redness not quite so marked. Vesicles on back and chest appear firmer to the touch, and on squeezing a portion of skin their contents do not flow out so readily. They also exist in numbers over the scalp, and are very thick on the forehead along a narrow strip just at the roots of the hair. Only a few are present on the face, and these are larger and more of the nature of bullæ. On the trunk and thighs they are most numerous, and on passing the finger over the skin in these regions the sensation of closely set fine papules is experienced.

The legs are œdematous, bright red in colour, and—especially about the small ulcers, which have now scabbed over—have a glistening aspect. Fauces and pharynx look quite natural, and are not at all congested. Urine normal in quantity, not very deep in colour. Sp. gr. 1015. Examination of the contents of the vesicles show them to be made up entirely of pus corpuscles, mixed with a considerable quantity of granular matter.

3rd.—8.30 A.M. Pulse 128; temp. 99.4. Tongue has lost its white coating and is now of a dark red colour, somewhat swollen and with papillæ prominent. She had a very good night and made a fair breakfast this morning. General redness still evident. Vesicles drying and disappearing on the chest. None have appeared on the legs, which are much less swollen to-day. Back and thighs very rough to the

touch from the partly desicated vessels, feeling like pig-skin or exaggerated *cutis anserina*. General symptoms good. Urine abundant, pale, and contains no albumen.

5.30 P.M.—Pulse 120 ; temp. 99. Tongue a little dry, dark in colour and studded with swollen papillæ. Rash fading on chest and extremities, still very intense upon the back. Some of the miliary vesicles have burst and disappeared from the trunk, leaving the skin roughened in parts. Several large ones exist now on the backs of the hands, which are filled with a purulent fluid, and similar ones, though larger, still remain upon the extensor surfaces of the arms. Feet and ankles have lost their glistening appearance and are not so much swollen. A few vesicles have come out upon the legs. Over the whole scalp the vesicles have uniformly coalesced, and the contents form a thin layer of purulent matter,—a miniature of what is sometimes seen in bad cases of confluent small-pox. Pain complained of in the back of the neck, a region where the vesicles were most abundant, and in drying have left it hard and painful. General symptoms continue good ; but the rash has opened twice ; urine contains no albumen. Sp. gr. 1012.

4th, 10, A.M.—Had a good night ; pulse 100 ; temp. 98.2 ; tongue moist, brighter in colour, and papillæ not so prominent. Throat natural. Skin still hyperæmic, especially about the back. Desquamation of fine, small crusts and thin scales beginning on the chest. On the back of the neck and about the axilla, the crusts are semi-detached and can be readily picked off. Back and abdomen still rough and granular, and on close inspection the dried remnant of each little vesicle can be seen. A few purulent bullæ still persist about the hands and legs. Urine pale in colour ; normal in quantity. Sp. gr. 1011. No albumen.

6.30 P.M.—Pulse 96 ; temp. 98.2. Tongue clean. Rash disappearing and desquamation progressing. Says she feels quite well.

5th, 9.30. A.M.—Pulse 88 ; temp. 98.2. Back covered with scales and fine crusts, which are rapidly becoming detached

and falling off. On the limb the scales are smaller, thinner and more furfuraceous. 6, P.M. Pulse 84; temp. 98.3.

6th.—Pulse 92; temp. 98. Desquamation proceeding rapidly, crusts almost all off the back and neck. Appetite good.

7th.—Pulse and temperature normal. Thin flakes of epidermis are peeling off the arms and legs. On the trunk the scales are smaller but exceedingly abundant. The back is still very rough and covered with small, fine scales. Urine natural.

8th.—Desquamation beginning on the face, and crusts can easily be picked away from the roots of the hair.

Appetite good; asked for meat.

9th.—Feet and legs covered with membranous flakes. Body quite clean.

12th.—Desquamation nearly completed. Urine abundant, pale. Sp. gr. 1010. No albumen. Microscopical examination negative.

16th.—Had a bath which has removed the rest of the scales. Several small pustules—Acne—have appeared about the face.

20th.—Quite well; ordered to be discharged.

Remarks.—A local eruption of miliary vesicles occurring in Scarlet fever is not uncommon enough to demand notice, but such a plentiful crop as was present in this case is rarely met with, even in epidemics characterized by this peculiarity. The pustular nature of the contents of the vesicles, from the first, their curious confluence on the scalp, and the existence of pemphigus-like blebs on the limbs, brings the case into the category of those described as *Scarlatina pustulosa*.

Not a little confusion would appear to exist as to the forms of Miliaria, and their relations to Sudamia, Hebra. Neuman and other German authors describe three forms: *rubra*, *alba*, *crysalina*, of which the two former constitute Sudamia, while the latter is regarded as Miliaria proper. Again miliary vesicles, as described by the above authors,

contain a watery, transparent fluid, of a feebly alkaline or neutral reaction, the contents of which never became pustular. In English works they are spoken of as cloudy, turbid and purulent from the commencement. Sudamia, according to the latter, are clear, transparent vesicles produced by sweating; Miliaria are turbid and purulent, not necessarily produced by sweating, but occurring often at the height of a febrile affection. These miliary vesicles correspond to Hebra's *M. alba*, which he reckons as Sudamia. Fox strikes at the root of the matter when he calls Miliaria inflamed Sudamina. There can be no doubt that, given suitable conditions—active hyperæmia of the skin with consequent augmented temperature and increased supply of pabulum—the minute particles of protoplasm, which exist in the fluid of almost all vesicles, would develop into pus corpuscles, just as they can be made to do outside the body in the serum from a blister.

In this case the vesicles appear to have developed independently of any sweating, and to have been pustular from the outset. The first morning they were noticed, I looked carefully for any trace of clear vesicles, but about the trunk none could be detected. On the legs, however, certain clear, sub-cuticular papules did exist, which from some cause or other did not develop, but it may have been—probably was—in this way that the Miliaria originated.

Quite an exceptional feature in this case, and one very rarely observed, was the entire absence of any affection of the throat. I examined her carefully, twice every day in a good light, and not even a trace of congestion was seen from first to last.

An interesting question arises: where are we to look for the source of infection? The small-pox department is separated by a considerable interval from the general wards as well as from the houses about, in both of which places scarlatina is rife. If we are to suppose the Scarlatina poison to withstand dilution to such a degree that it remains active after passing through the wide space which

separates the Small-pox hospital from the neighboring buildings, can we attribute a minor degree of vitality to the small-pox germs which must be wafted out of the ventilating shafts in countless numbers to be distributed in the neighborhood? Experience has taught us that we cannot.

Another, and perhaps more likely, source of infection must not be overlooked. On the 11th and 12th ult., I attended for a *confre* a case of Scarlet fever in the immediate vicinity of the hospital, and on the evening of the 12th I went direct from the house to the hospital. At this period she was almost convalescent. The stage of incubation is so variously placed by different authors, ranging from three days to a month or more, that this may have been an instance of prolongation of the period of latency. With an impoverished condition of blood the Scarlet fever poison may not have met with sufficient quantity of that "mysterious something," different for each exanthem, upon which the germs are supposed to live, grow, and at last, happily, exhaust; and hence a lengthened period of incubation, with retardation of the eruption.

Case of Multilocular Ovarian Tumour.—Removal.—New Method of Ligaturing the Pedicle. By JOHN BELL, A.M., M.D.

On the 14th of June, I was requested by Madame M. to see her daughter who was suffering from a tumour in the abdomen. I saw her the next day, and diagnosed the tumour to be ovarian and cystic in its nature and recommended its removal.

The patient, a French Canadian, recently came up with her family from Rivière du Loup, *en bas*. She is 21 years of age, single, of medium height, of well-developed figure and frame, with pale or rather sallow skin. Until the last few days she had been able to walk about with comparative comfort, but now she spends most of the time lying down. Her appetite has been habitually poor, and there were but

a grain of pepper, that looked like cicatrices, but no corresponding mark could be found on the mucous surface.

The greatly enlarged spleen, firm and mottled all over with whitish spots, occupied a large part of the left side of the abdominal cavity. It was tolerably regular in form, elongated like an almond, and presented the usual notch in its anterior edge, together with several smaller sinuosities towards its lower ends. It measured about 13 inches in length, $6\frac{1}{2}$ inches in breadth, 17 inches in circumference horizontally at the middle of the periphery, and weighed — lbs — oz. The veins and splenic artery were proportionally increased in calibre. Dr. Osler has kindly examined the minute structure of the spleen as well as that of the other organs and tissues, and I believe has prepared a paper and microscopic sections, embodying and illustrating his observations.

The liver was considerably enlarged, and its cut surface was glistening and smooth, and of a greyer colour than normal. There was no means of weighing it. The kidneys were about normal, &c., in size and appearance, with the exception of being flattened out from pressure, the left one in particular being very much expanded. Some parts of the cortical substance were paler than others.

Some of the mesenteric glands were a little enlarged. Several of the retro-peritoneal glands were also increased in size and slipped readily from their investing tissues. They seemed to have a white watery appearance and be more friable than usual. The brain was not examined.

I, Beaver Hall Terrace,
Jan. 26th, 1876.

VI

Remarks on the Histology of the above case. By WILLIAM OSLER, M.D., L.R.C.P., London. Professor of Institutes of Medicine, McGill University.

Beginning the description with the blood—the tissue most remarkably altered in this disease—it may be noticed in the first place, even with the unaided vision, a peculiar creamy

look in the slides prepared for examination. This is very characteristic, and when seen in blood taken from an adult is in itself evidence of an excess of colourless elements. In sucklings the same appearance is seen after feeding from excess of fatty matter in the blood. In a specimen sent me for examination some time before the death of the individual the colourless corpuscles numbered at least one-third of those in the slide; the majority of them in appearance resembled the ordinary colourless elements, many, however, were smaller, others a little more granular than usual. One feature, not at all usual in ordinary corpuscles, was the presence in most of a single, clear, vesicular nucleus. Blood taken from the heart and splenic vein after death presented very much the same characteristics; the colourless corpuscles from the latter situation varying greatly in size. The general experience in Leukæmia is that the colourless elements of the blood are somewhat larger than in health. No such conclusion can be drawn from this case as was evident by an examination and comparison of sketches of two sets of healthy and leukæmic corpuscles, drawn to scale. Though some of the latter were larger than normal, others again were much smaller, and the average size in the two sets was very nearly the same. Apart from the increase in number, the presence of a single vesicular nucleus in most of the corpuscles was their most striking feature, and one not common in either leukæmic or healthy blood. When first examined a nucleus may not be seen in normal corpuscles, but after a time, especially if reagents—acetic acid—be added, two or three may develop, and the same number is spoken of as occurring in the colourless corpuscles of leukæmic blood.

Peculiar crystalline bodies, which will be referred to hereafter, were found in the blood of the specimen first given me, and also in the blood from the splenic vein and heart.

An unusual tendency to crystallize, not often met with in human blood, existed, and from the specimen examined during the life of the patient the Hæmoglobin separated

out in small square tablets and in long rectangular prisms. In a slide of blood from the heart, which was surrounded with oil and laid aside for a week, some enormous tablets and prisms crystallized out.

In the heart were several large clots of a peculiar greenish-yellow colour, like masses of semi-solidified pus. Some of these were seated on dark grumous bases, others were uniform throughout, while one was capped with a layer of transparent gelatinous fibrin infiltrated with serum. On examination the greenish coagula proved to be collections of leucocytes entangled in the meshes of the coagulated fibrin; while, after hardening, the cut sections presented a remarkable similarity to lymphoid or adenoid tissue, consisting of a reticulated network, in the interspaces of which the cells were enclosed. One or two decolourized clots were met with in the splenic vein.

SPLEEN—Teased portions showed numerous small corpuscles, very like those met with in the pulp of healthy organs, together with other larger cells, leucocytes, in tolerable abundance. Nucleated fibre cells existed in great numbers, constituting in many specimens the majority of the formed elements. Normally these occur about the smaller vessels and in the connective-tissue framework of the organ, but not in the proportion found in this case. Red blood corpuscles and much fibrous tissue were also present. No traces of the Malpighian corpuscles remained. Sections taken from different localities demonstrate that the chief change in the organ had occurred in fibrous elements which were everywhere enormously hypertrophied, being both relatively and absolutely increased. Thin sections of a healthy organ, (such as you see under one of the microscopes,) show little else than a dense aggregation of small round spleen corpuscles, and it is only at the thinnest portions, and with high powers, that the delicate fibrous stroma of the pulp can be detected. In this case exactly the reverse holds good. Not only the coarse bands which, as in the normal organ, dip into the substance

are hypertrophied, but also the excessively fine adenoid network forming the matrix of the pulp ; so that with a low power we see a tissue composed apparently of nothing but fibres crossing each other in all directions, and having little, if any, resemblance to the structure of the healthy organ. From the remarkably irregular course of the fibres and their arrangement, a peculiar appearance is given to the sections which will be best understood by an examination of the specimens. Light and dark columns of fibrous tissue are seen crossing each other in every direction, four or five often radiating from one point, corresponding generally to a transversely cut splenic vessel. Thin sections highly magnified further show the extent of development of the fibrous tissue, and the relation of the cells to the reticular network, explaining, moreover, the light and dark areas which give such an extraordinary appearance to the specimens when examined under a low power. Extending from the larger trabeculae coarse and fine fibres proceed which uniting enclose rounded or irregular-shaped areas, and from these others originate forming similar spaces. The nodal point of these fibres is usually somewhat triangular in shape, and a small nucleus is not unfrequently seen, so that in places they are or appear to be formed by the union of the processes of stellate fibre cells. Such an arrangement, I may remind you, constitutes the stroma or fibrous matrix of all lymphatic structures, and is known as an adenoid tissue. Normally it occurs also in the spleen pulp, enclosing the cells in an exceedingly delicate reticular network very difficult to make out. In this case the delicate stroma is greatly hypertrophied, and constitutes with the coarse bands dipping in from the capsule the bulk of the organ. The relation which the cells bear to the stroma is very easily made out, the latter simply encloses them in its meshes, and according to the width of these one, two, or more cells are included. In most instances the meshes are so small that only a single corpuscle is enclosed, which appears, moreover, closely embraced by the fibrous net. In other instances two or more corpuscles may be counted in a single areola.

The dark and light columns referred to above are found to depend on the presence or absence of corpuscles in the meshes; in the former case they are retained, hence the darker appearance; in the latter they are absent, and in consequence these columns look much lighter. A precisely similar structure is met with in the lymphatic glands, in which the light areas constitute the lymph paths, while the dark columns, termed the follicular cords, are filled with the lymph cells imbedded in an adenoid matrix. The lymphatic vessels after penetrating the glands ultimately open into the lymph paths, or clear columns, and the lymph in passing through disengages or washes away the corpuscles from the contiguous follicular cords or dark columns.

Substituting in the spleen the blood-vessels for lymphatics, there is a remarkable similarity—not only in general structure, but in the relation of the blood current to the cells and fibrous network—between this organ and an ordinary lymphatic gland; so much so that Frey, Müller, and others describe it as a blood-lymph gland. According to their description the "blood from the arterial capillaries is emptied into a system of intermediate passages, which are directly bounded by the cells and fibres of the network of the pulp, from which the smallest venous radicles take their origin." The colourless corpuscles are supposed to develop from the cells of the pulp, and are washed out by the constant current of blood passing through the organ. Hence the increased number of these elements met with in the blood of the splenic vein. Some even believe that these colourless elements may while still within the spleen pulp develop into coloured corpuscles, but of such a process we have no definite knowledge. This being the case, it would appear easy to explain the etiology of this disease: hypertrophy of the organ, increase of the cellular elements, more rapid formation of colourless corpuscles, and conduction of these into the circulation by the blood current would be steps in the process. Unfortunately, there are insu-
pera-

ble difficulties in the way of any such explanation. We know of half-a-dozen hypertrophies of the spleen—more genuine hypertrophies too than are met with in Leukæmia—in which the normal proportion between the elements is maintained, yet wholly unaccompanied by any increase in the cellular elements of the blood. To say that in the simple hypertrophies there is retention of formed elements, while in Leukæmia there is a rapid increase, and as rapid separation of colourless elements, incapable of developing into red blood corpuscles, is simply to admit our ignorance of the intimate pathology of this obscure affection.

Again, there is a disease Anæmia lymphatica, or Hodgkin's Disease, characterized by enlargement of the lymphatic glands of the body, generally without any accompanying hypertrophy of the spleen, and without any increase in the colourless elements of the blood; and yet this is equally pernicious and runs a like fatal course. Further, there is a variety of Leukæmia, excessively rare indeed, marked by hypertrophy of the lymphatic glands all over the body without corresponding enlargement of the spleen. I mention these affections, so like in some respects, so unlike in others, just to illustrate the difficulties in the way of establishing a correct pathology of lymphatic disorders.

Passing to the consideration of the liver we meet with changes equally remarkable. On section of the organ, and also through the capsule, irregularly scattered areas of a white or yellowish white appearance were seen, nowhere distinctly isolated, but merging into the surrounded liver substance. Portions taken from these areas and teased in saline solution presented a great accumulation of round colourless corpuscles, ordinary leucocytes, very similar to those met with in the blood, many of them with the same clear vesicular nuclei. They presented considerable variations in size. The proportion of these corpuscles differed according to the locality from which the piece was taken; from the central portions of some of the larger

white patches they formed almost the only elements in the field, in others the liver cells were present in abundance mingled with the former. Irregular cells filled with yellow granules constituted the sole remains of liver structure in some places, while in others the cells were not so much degenerated, but a little irregular from pressure. Many possessed double nuclei. Some irregular shaped connective tissue corpuscles were found in these specimens. In the more natural looking liver areas the cells were found in a healthy condition, not at all fatty, and with very little granular matter. In these portions leucocytes were also found but in greatly diminished numbers.

Cut sections (made after hardening the organ in Müller's fluid and alcohol) are exceedingly instructive with regard to the distribution of the leucocytes. Thin sections of healthy uninjected liver, when cut transversely to the central veins of the lobules, show elongated cords or columns of hepatic cells converging towards the openings of the central veins, with very little intervening space between contiguous columns. Similarly in a section parallel to the central vein these columns appear cut across and are seen to unite with neighbouring columns, small empty spaces representing the position occupied by the vessels, existing between them. In this leukæmic liver an extensive infiltration of leucocytes existed between the columns of liver cells, and formed the essence of the disease in the organ. In some situations they were few in number and the surrounding liver substance was little effected, in others wide areas filled with them were seen between thin atrophied cords of hepatic cells. A still further change was seen in many places; atrophied remnants of liver cells occurred interspersed in a tissue made up of leucocytes, surrounded by a finely granular or fibrillar matrix. Indeed, so closely were the leucocytes set together, and so scanty the remnants of liver substance, that in spots it looked like a tissue infiltrated by a malignant growth—a small cell Sarcoma. Of all organs the liver is the most frequently

affected by leukaemic growths, and occasionally is found much more diseased than the spleen. The leucocytes filling the spaces between the columns of liver cells are usually regarded as white corpuscles which have wandered from the blood-vessels, and certainly the conditions in the liver are most favorable to such a process. The blood in the portal veins has already traversed one set of capillaries and must circulate in the intralobular plexus under extremely low pressure. We know that the colourless elements of the blood have a great tendency to adhere to the sides of the vessels, especially under diminished blood pressure, and very readily migrate through. They are sticky adhesive bodies when in the vessels, and adhere to one another and to the walls with great pertinacity. That all the leucocytes in such a liver are to be regarded as vagrant white corpuscles may be doubted. It is much more probable that by a process of fission they have multiplied enormously in the leukemic tracts, causing atrophy of the liver substance. Indeed, these aggregations of leucocytes may themselves have been foci for the origin and development of others, which, passing into the blood current, served to augment the colourless elements.

KIDNEYS.—The portions of these organs removed for examination did not show any marked alteration in structure. Here and there groups of leucocytes were seen between the tubules, but the process was limited, and no extensive growths, as often met with, were found.

LYMPHATIC GLANDS.—These did not appear much, if at all, enlarged, and those removed (mesenteric and lumbar) did not give evidence of any hyperplasia of their cell-contents. The one which, so far, I have specially examined showed a great increase in the fibrous elements with a corresponding diminution in the cells.

Some remarkable crystalline bodies were found in the blood and liver, forming colourless spindle-shaped prisms, of very beautiful and regular shape, varying much in size. I can offer no explanation of their nature, not having

time to test them properly. Many crystalline organic principles—Xanthin, Hypo-xanthin, Creatinin, and others—have been found in the blood and organs in this disease, but whether the ones here referred to have any connection with either of these I cannot say.

Case of Imperforate Rectum, Colotomy in the region of the Sigmoid Flexure—Recovery. By WILLIAM GARDNER, Professor of Medical Jurisprudence, McGill University.

On the 1st February of this year I was asked to see a male child, two weeks old, whose bowels I was informed had never been moved. On enquiry I found that the child had had several attacks of vomiting (on one occasion only, of stercoraceous character), but had not seemed to suffer much in other respects, and nursed fairly well. The skin was of a somewhat sallow or dirty hue and withered or shrivelled in appearance, the abdomen very much distended, and the superficial veins greatly enlarged, and distinctly visible through the integument. On examination the anus with sphincter and rectum to the extent of three quarters of an inch were found to be perfectly normal. To the examining finger the cul de sac felt puckered as if from a cicatrix; when the child strained, which the presence of the finger in the rectum seemed to induce it to do, a boggy semi-fluctuating sensation is perceptible.

Being by no means certain that a portion of the rectum was not absent, I did not dare to attempt to establish the natural passage, but concluded that the safer plan would be to open the bowel in the left groin, leaving the question as to the propriety of any attempts in that direction to be decided by the additional light which I expected would be thrown on the case by exploration from the artificial opening in the groin.

Consequently, on the following day and with the valuable assistance of my friend, Dr. Wilkins, I proceeded to perform the operation of colotomy, in or as near as might

be, the sigmoid flexure. The child having been chloroformed, I made an incision an inch and a half in length, extending in an oblique direction upwards and outwards from the middle line to a point about half an inch beyond the anterior superior spinous process of the ilium, dividing the skin, and cellular tissue or superficial fasciæ till I reached the muscles, which with the transversalis fascia, and peritoneum were successively divided on the director. The distended bowel lay immediately beneath ready to hand. The gut was transfixed by two curved parallel needles, half an inch apart, and each threaded with double ligatures of carbolized catgut, after which it was opened and the edges attached to those of the wound in the integument. A large quantity of meconium of a greyish-yellow colour was immediately voided. The substance of the coats of the bowel was found to be very easily lacerated as if softened, from the effects perhaps of previous inflammation from the distension. The operation, although tedious, was one which presented no very great difficulties in its performance. Some bleeding from the lower extremity of the wound was arrested without much difficulty. At no time after the operation had the child a single bad symptom but nursed and slept as if nothing had happened. The skin rapidly lost the dirty sallow hue it previously presented, and at the end of a fortnight the little fellow became quite plump and healthy-looking.

Repeated explorations of the bowel, first with elastic bougies, and subsequently with a whalebone probe, introduced through the opening in the groin, conjoined with the finger in the canal *cul de sac*, lead to the conclusion that the rectum is absent for a portion of its length, as the probe thus used cannot be made to pass downward for more than about three quarters of an inch, and cannot be felt by the finger. The most remarkable fact in the case, perhaps the only one excepting of course the success of an operation so frequently fatal, is that this child should have lived for a fortnight (as it did) previous to the operation, in a condition of compara-

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CLINICAL NOTES

ON

SMALL-POX.

I. THE INITIAL RASHES.

VIII

II. HÆMORRHAGIC SMALL-POX.

IX

III. A FORM OF HÆMORRHAGIC SMALL-POX. X

BY

WILLIAM OSLER, M.D.,

LATE PHYSICIAN TO THE SMALL-POX DEPARTMENT OF THE GENERAL HOSPITAL,
AND PROFESSOR OF THE INSTITUTES OF MEDICINE, MCGILL
UNIVERSITY, MONTREAL.

[1876]

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I. THE INITIAL RASHES

In the abundant literature of small-pox, contained in the standard text-books, and scattered through the various periodicals, mention is occasionally made of rashes occurring in the initial stage of the disease. The reference to them in the ordinary English works on the Practice of Medicine is usually limited to two or three lines, stating that the eruption is sometimes preceded by an erythematous or erysipelatous rash. (See text books of Aitken, Wood, Watson, Niemeyer, Barlow.) Many make no mention whatever of them. (Bennett, Tanner). Even in the special works on the subject the notice is scarcely more extended.

Thompson* refers to a roseolous rash as a common precursor of varioloid.

Munro† speaks of a "rosy efflorescence as in measles preceding the eruption in malignant small-pox."

Gregory‡ makes no mention of them, but refers to a scarlatina-like rash in the progress of the secondary fever.

* On Varioloid Diseases, pp. 35.-151.

† On Small-pox, p. 97.

‡ On Eruptive Fevers, p. 49.

Marson* states, that in varioloid the eruption "is very often preceded by roseola, which lasts two or three days—the r. exanthematica."

Foreign Physicians appear to have paid more attention to them, and very good accounts are to be found in some of the recently translated works †

Many of the older authors believed them to be independent affections, and, according as the eruption was diffuse or mottled, spoke of scarlatina or measles occurring simultaneously with small-pox.

Sydenham was evidently acquainted with them, and refers to the difficulty they may cause in the diagnosis. "The aforesaid small-pox," speaking of the discrete form, "breaks out sometimes after the fashion of erysipelas, sometimes like measles. From these they are difficult to be distinguished even by the practised physician, provided that he goes by the external appearance only."‡

In some of the cases collected by Murchison§ of the supposed coincidence of two fevers at the same time, the mistake has been made of confounding the initial rashes with independent diseases.—(Illustrations, 3, 4, 5, 6, 7, 8, 9, 10.)

Our definite information on the subject dates from the publication by Dr. Theodor Simon of Hamburg (whose premature death last year was a severe loss to the profession in Germany), of a series of articles in the Archives f. Dermatologie und Syphilis, Bds II, III, & IV, on the "Prodromal Exanthems of Small-pox." Other papers on the subject appeared in the same journal from the pens of Drs. Knecht and Scheby-Buch, and less important observations have been published in several of the German periodicals within the past four years.

The probable reason why such scanty reference to them is found in the records of the older epidemics is that they appear

* Reynolds' System.—Article Small-pox.

† Trousseau.—Clinical Medicine (Sydenham Society) Vol. 2. Hebra. Skin Diseases, (Sydenham Society) vol. 1.

‡ Ziemssen's Encyclopedia, Curschmann. Art Small pox.

§ Works of Sydenham (Sydenham Society) Vol. 1, page 127.

§ Med. Chirurgical Review, 1869.

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1909 March 5 Street,

Philadelphia, December 25th, 1908.

Dear Dr. Cooper:-

42.25

I enclose for check for ~~42.25~~ 42.25. I think, will cover it. I don't wish you want to, less the sum to be collected by you from Drs. Wilson, Huxley, Green and from my collection. If I do not wish, please let a favor. Thank you for your kind cooperation in this matter I wish always,

Yours very sincerely,

Charles R. Hills.

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with great irregularity, some epidemics, as the one now subsiding, affording numerous instances, others very few.

Two forms of these rashes are to be distinguished, the diffuse scarlatiniform, and the macular or measly, either of which may be accompanied by petechiæ, and occupy a variable extent of the cutaneous surface. In some instances they are general, covering the whole body; as a rule, however, they are limited and show a decided preference for certain localities. This holds good especially for the purpuric rashes, which occur with greatest frequency in the abdominal region, occupying a triangle the base of which is formed by a line drawn from one anterior superior spinous process of the ilium to the other, the sides by Poupart's ligaments, the apex corresponding to the pubis. Another favorite situation is the inner surfaces of the thighs, (the crural triangle of Simon). A third is the lateral thoracic region, in a strip extending towards the navel, along the margins of the ribs. The above are the usual sites for the purpuric rashes, and in the majority of cases they occur in one or all of them. The simple erythematous and macular rashes, unaccompanied by petechiæ, are often much more extensive, spreading over larger areas. When limited, in which case the presence of purpura is common, they occur in the above-named situations, and also, according to Simon, "in the axillary regions, (axillary triangle) the extensor surfaces of the extremities, especially in the neighborhood of the knees and elbows, the backs of the hands and feet, on the genitals, and lastly, as a streak extending from the ankle along the skin over the extensor hallucis longus."

My experience has been that they are chiefly purpuric; in the limited number of cases which I have observed, only two, were unaccompanied by petechiæ. In very many of the cases reported by Simon and Knecht no mention is made of the presence or absence of cutaneous extravasations. Scheby-Buch, on the other hand, believes them to be, in most instances, of an hæmorrhagic nature, *i. e.*, numerous petechiæ occur upon an erythematous base. The following cases will give a good idea of the nature and extent of these initial rashes.

CASE I.—D. R., æt. 14. Admitted November 28th. Vaccinated, one good mark. Revaccinated 8 days before admission, three points, which had taken, were just passing into the pustular stage. A diffuse erythematous rash of a dark-red hue existed over the abdominal region, extending upwards in the lateral thoracic areas, and downwards upon the thighs. Face much suffused, extremities unaffected. On pressing with the finger upon the skin of the abdomen, numerous petechiæ were evident, most abundant in the groins, and inner surfaces of the thighs.

Temp. 101°. Slight delirium. A papular eruption over face and arms.

29th.—Erythema has disappeared, leaving the ecchymoses visible as small, dark, punctiform spots, closely set together in the groin, and more scattered towards the navel. The largest existed in the lateral thoracic regions, over the serrati muscles. A few were also noticed on the legs about the inner surfaces of the tibiæ.

Course of the Disease.—Eruption became confluent on the face, discrete on the extremities and trunk. Not more than eight pocks appeared on the sites of the erythema. Instead of proceeding to maturation, the majority of the pustules aborted, and on the 11th day of the disease desiccation had begun.

CASE II.—J. C., æt. 23, medical student. Vaccinated, one good mark. Admitted, December 15th, 1874. Initial symptoms, according to his own statements, had been tolerably severe. Papular eruption present on the face and arms. On examining the trunk a fading erythema was noticed over the thorax and abdomen. A diffuse ecchymosis existed over the anterior surfaces of both shoulder joints, extending above over the acromion processes, and internally over the outer half of the clavicles. Continuing into the axillæ, it involved the greater part of the skin in these fossæ, terminating below at the level of the fifth rib. A considerable amount of hyperæmia was present, and pressure with the finger revealed the fact that the ecchymosis was not uniform, but here and there left portions of the skin unaffected.

Numerous purpuræ in the groins and lateral thoracic regions, some of which were of considerable size ; none on the extremities, or inner surfaces of the thighs. Temp. 100.5°. General symptoms good. Pulse firm and strong.

Course of Disease.—Pocks numerous but discrete, and proceeded regularly to pustulation. Ecchymoses faded gradually leaving a yellowish-green discolouration of the skin over the shoulder; and in the axillæ. Desiccation early. Rapid recovery. No complications.

The first case affords an excellent example of the condition under consideration. The exanthem occupied the most usual situations, viz., the anterior abdominal and lateral thoracic regions, together with the inner surfaces of the thighs. On superficial examination the ecchymoses were not at first evident, becoming so, however, on the following day, when the erythema had faded.

The second case presents several points of interest. The initial symptoms were so severe, and such was the intensity of the prodromal exanthem, and extent of the cutaneous extravasations, that the gentleman who attended the case, though possessed of considerable experience in small-pox, believed it to be of the true hæmorrhagic variety. On first seeing it I expressed a similar opinion. The remarkable extent of the ecchymoses in the neighborhood of the axillæ was certainly very misleading, more especially, as it was accompanied by an eruption of purpura in the thoracic and lower abdominal regions. Indeed, in such a case, within the first 48 hours, it might be almost impossible to decide definitely, whether we had to deal with a simple prodromal exanthem, or with the initial symptoms of genuine hæmorrhagic small-pox. In the latter the exanthem would probably be more general, of a deeper hue, and present a greater number of petechiæ, and even on the second day hæmorrhage might take place from the mucous membranes.

The two following cases are the only instances which have come under my notice of a simple erythematous rash unaccompanied by petechiæ. Oddly enough, both subsequently became hæmorrhagic ; in one the extravasations were limited to the

pocks upon the legs, and a good recovery was made ; the other proved to be of the true hæmorrhagic variety.

CASE III.—J. M., æt. 25. Vaccinated, one good mark. Admitted, January 28th. Initial symptoms not severe. A diffuse erythematous rash existed over abdominal and thoracic regions. According to patient's statements, it had been brighter, and was fading at time of admission. It was unaccompanied by any purpuric spots, either in the regions affected, or in other parts of the body. Eruption discrete, papular, very scanty upon the abdomen.

Course of Disease.—Progressed favorably, but presented peculiar characters, inasmuch as extravasation took place about the pustules on the legs on the 5th day, and was followed by a subsidence and rapid desiccation of the eruption.

CASE IV.—A. McR., æt. 19, a strong Scotch girl. Unvaccinated. Admitted January 31st, from the general wards, where she had been under treatment during two weeks for some ill-defined affection. Initial symptoms very severe. There was on admission a deep erythematous rash over the whole body, most intense on the abdomen and thorax, and unaccompanied by ecchymoses. Face and arms of a deep red colour. Papules very general. Temperature 103.3°. Pulse, 116. Respirations, 22. Feb. 1st, erythema fading on the trunk.

Course of Disease.—This case proved to be of the hæmorrhagic form, and is interesting from the fact, that a *simple* erythematous rash was among the initial symptoms, the extravasation into the skin not occurring until the third day of the eruption, when the erythema had disappeared.

Patients are usually sent to hospital on the third or fourth day of the disease. The initial rashes are often among the earliest symptoms, and may, if of the simple erythematous variety have disappeared, whereas, if purpuric in character traces of them will remain for days. In some instances, a fading erythema was noticed on admission ; in others, no history of any could be obtained, though the petechiæ were present. The following cases illustrate this :

CASE V.—M. C., æt. 15. Vaccinated, one good mark. Admitted Jan. 18th. Initial symptoms severe, well-marked rigor. Temp. 102.2°. Pulse 102. Resp. 24. Only a few papules visible on the face and about the wrists. Petechiæ on back, sides, groin, and legs. Those upon the back were scattered and small, on the abdomen they were thickly set and large, especially in the hypogastric region. On the lower limbs they existed as small circular spots of dark red colour on the inner surface of the thighs and the extensor surfaces of the legs. In this case I could obtain no history of an erythematous rash.

Course of Disease.—Favorable. Eruption discrete; desiccation early; recovery rapid.

CASE VI.—T. C., æt. 20. Vaccinated, one good mark. Admitted Feb. 16th. Initial symptoms moderate. Eruption discrete, in the papular stage. Abundant petechiæ in the lower abdominal region, and in the groins; also a few over the serrati magni muscles. None upon the thighs, or legs. No trace of an erythematous rash, nor could it be gathered from the statements of the patient that one had existed.

Course of Disease. General symptoms good; pustules formed normally. Purpura faded within the first week.

CASE VII.—T. B., æt. 22. Vaccinated, one good mark. Admitted December 31st. Eruption discrete and in the vesicular stage. Temperature 98.4°. Ill since the 27th. Initial symptoms mild. Numerous small purpuric spots in the groins, arranged chiefly parallel to Poupart's ligaments, and extending internally over the recti muscles. Similar spots, though somewhat larger, existed in a line with the lower ribs, extending towards the navel. According to the statements of the patient, on the second and third day of his illness, there was a rash on the lower abdominal region.

Course of Disease.—Pustules few in number. Recovery rapid.

CASE VIII.—R. W., æt. 20. Vaccinated, one indifferent mark. Admitted Jan. 10th. Initial symptoms mild. A plentiful eruption on face, buttocks, and arms. A diffuse erythema pre-

sent over the whole trunk, and, in a limited degree, over both elbows. Accompanying this were abundant petechiæ, especially numerous in the groins, the lumbar region behind, and the posterior surfaces of the thighs. Jan. 11th. Erythema had disappeared entirely. On the buttocks, back, and extensor surfaces of the arms and thighs, the pustules were collected into small groups.

Course of Disease.—Pustules did not mature fully; desiccation early. Recovery rapid. This was the only instance in which the initial rash was present on the extensor surfaces of the joints.

Occasionally the initial rash is late in appearing, and may follow rather than precede or accompany the eruption.

CASE IX.—H. A., æt. 28. Vaccinated, five good marks. Admitted April 3rd, with a disseminated papular eruption. Initial symptoms had been tolerably severe.

April 4th. At morning visit an erythematous rash, accompanied by numerous petechiæ existed over the lower abdominal regions, and groins. Erythema not intense, petechiæ small, and closely set together.

April 5th.—Rash had disappeared.

Course of Disease. Pustules developed well. General symptoms good. Purpura had faded by the seventh day, leaving light brown discolourations to mark the places where they had existed.

The initial rashes in the foregoing cases, with one exception, (case IV), occurred in the discrete form of variola, and though recovery, as a rule, was rapid, none of the cases could properly (unless, perhaps, case VII), be classed as varioloid. One of the last patients admitted into the Hospital afforded an instance of an initial purpuric rash in the mildest possible form of small-pox.

CASE X. W. A., æt. 17. Vaccinated, two good marks. Admitted June 2nd. Eruption scattered, pustules few in number, not more than 30. On admission an abundant purpuric eruption, accompanied by a slight degree of erythema, existed

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over the lateral thoracic regions, the abdomen, and inner surfaces of the thighs. Between the navel and the pubis was a large superficial ecchymosis, about half the size of the hand, extending in a somewhat semi-lunar form. The purpuric spots in the groins were of large size, and arranged chiefly parallel to Poupart's ligaments, at a distance from $\frac{1}{2}$ "-1" above them. A few isolated ones extended over them to the anterior region of the thighs, while others existed on the upper third of the inner surfaces.

Course of Disease.—Up on the 5th day.

The last case observed is interesting from the fact that the initial rash took the form of an extensive urticaria.

CASE XI.—A. E., æt. 29. Vaccinated, one bad mark. Admitted April 7th. Initial symptoms had been moderate. On examination an eruption was found upon the trunk and extremities which presented the usual characters of urticaria, viz, elevated reddened patches of unequal size, in some places arranged linearly, in others forming broad areas, light in the centre, deep red at the periphery. On the trunk they were chiefly grouped together, being most abundant on the anterior surface, while on the extremities they were arranged in raised lines, the typical wheals of the affection. In the neighbourhood of the ankles and back of the feet they were of large size, and showed better than anywhere else the characteristic features of the eruption. The patient complained of sensations of heat and itching, and wherever he scratched violently a fresh outbreak occurred. A few papules of variola were noticed on the face, and about the wrists.

April 8th—Urticaria persists, though not so marked on the trunk.

April 9th.—Has disappeared from the trunk, and greater part of the extremities; a few only remain about the ankles. At the evening visit no trace of urticaria could be found. Pocks few in number, not more than 60.

Patient got up on the 10th, and remained in the hospital twelve days.

Simon* expresses himself as somewhat sceptical about the

* Loc. Cit.

occurrence of genuine urticaria as a prodromal exanthem in small-pox, believing that most of the cases described as such should be referred to the macular or measles rash. I think there can be no doubt about this case, the wheals were too characteristic to allow of mistake. A genuine case is also reported by Starek, (*Arch. der Heilkunde*, Vol. iv.) in which the urticaria appeared and disappeared in different parts of the body in the course of the disease.

Simon calls attention to the fact that the simple macular and diffuse rashes are not unfrequently accompanied by sensations of heat and itching, which in the case of the former might cause them to be confounded with urticaria.

The frequency with which the prodromal exanthems occur is apparently subject to considerable variations, depending, perhaps, on the type of epidemic, which has exhibited marked changes within the present century. The epidemic which has raged in so many parts of the world since 1870 has been of an unexampled severity, owing, in great part, to the large proportion of hæmorrhagic cases, and has been further marked by the very general prevalence of the prodromal exanthems. That no reference is made to them by so many of the old authors, and that such scanty notice is found in the more modern works, can only be explained on the supposition of their infrequency in former epidemics.

In 1088 cases of small-pox observed by Knecht, (*Arch. f. Derm. u. Syph.* iv), prodromal exanthems occurred in 104 or about 10 per cent. In 1413 cases of Scheby-Buch there were 237 instances of these rashes, or 16 $\frac{3}{4}$ per cent.

In 81 cases under my care there were 11 instances, *i. e.*, about 13 per cent. Simon does not give the percentage in his cases, but from the number recorded in his series of articles on the subject it must have been large.

The localities most commonly affected are the anterior abdominal surface, and the inner surfaces of the thighs. Thus, in Scheby-Buch's 237 cases these regions were affected in 190 instances. In the few instances which have come under my notice, the lateral thoracic areas were more frequently the seat

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* Loc.

of the exanthem than the inner surfaces of the thigh; nor did I observe any cases in which the rash was absent from the anterior abdominal regions. Many cases are recorded in which the exanthem remained limited to the regions of the joints, (elbows and knees), or the backs of the hands, the axillæ, the inner surfaces of the thighs, without the simultaneous eruption of the abdominal surfaces. When confined to the extremities, both upper and under are implicated as a rule, the rash is rarely limited to either alone. Occasionally they are unilateral, in which case they are always of small extent. The general erythematous rashes are rare; in Scheby-Buch's 237 cases there were only 14 instances. Neither of the above mentioned authors state the proportion between the simple erythematous rashes and those accompanied by purpuric spots. Indeed, in the reports of many of Simon's cases no mention is made of their presence or absence. In the 11 cases which have come under my notice the latter greatly exceeded the former, the proportion being 8 : 3.

A consideration of the diagnostic and prognostic value of the initial rashes is of great interest: for, of course, the worth of a symptom is in direct ratio to the amount of knowledge it gives us in deciding upon the nature of a case, and forming an opinion as to its probable issue.

From the fact that a patient is rarely or never sent to Hospital until the characteristic eruption has made its appearance, *i. e.*, on or about the fourth day of the disease, none of the above cases were of any service to me in forming a diagnosis; that had already been made. In any case the value of the initial rash depends greatly on the date of its outbreak, which extends from 1 to 5 days before the appearance of the eruption. In the majority of cases it comes out on the second day, and if of noticeable extent would consequently be of diagnostic importance, more especially if accompanied by petechiæ. Indeed, Curschmann* states that in the initial stage of the disease there is only one pathognomonic symptom, and that is, the hæmorrhagic exanthem situated in the triangle of the thigh. The petechial rash is of much greater diagnostic value than the simple erythematous, and a case of fever presenting an eruption of

* Loc. Cit.



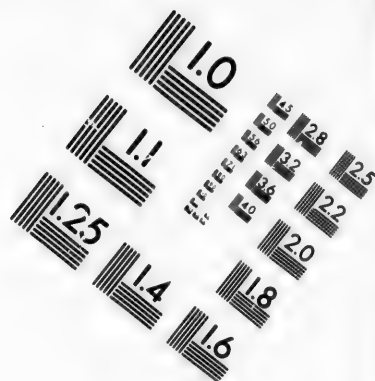
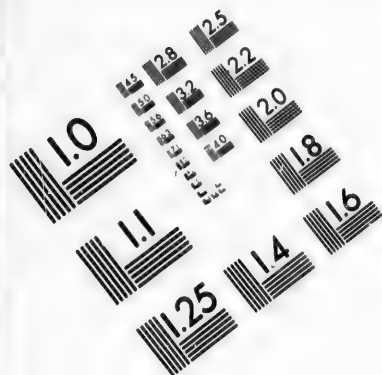
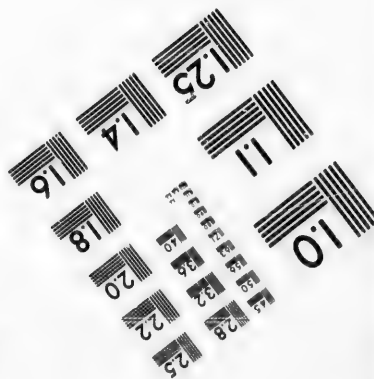
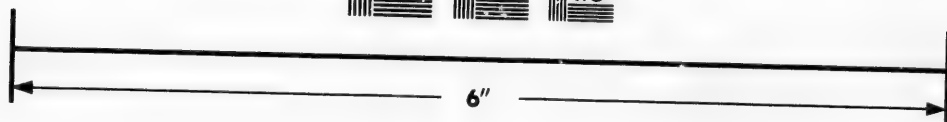
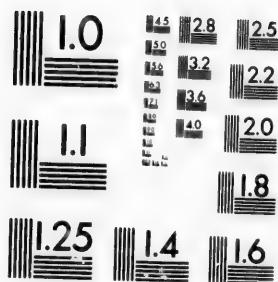


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purpura in any of the above oft-named localities on the second or third day should be looked upon with grave suspicion. Simon maintained that even before the onset of the fever, and prior to the general disturbance of the system, the diagnosis could be determined by the appearance of the characteristic prodromal exanthem. This is going very far; still, he has recorded two such cases, and quotes two others. In his 38th case there was an initial rash in the inguinal regions, and about the anus, for the greater part of a day before the onset of the fever and constitutional disturbance. The former set in with a rigor, and was followed by a great extension of the exanthem. It is to be remembered that prodromal rashes are not peculiar to small-pox, though, no doubt, they occur with much greater frequency in this disease than in any other. Scheby-Buch states that he has met with simple erythematous rashes in the initial stage of tonsillitis, typhoid fever, and measles, presenting the same distribution, and differing only from those of small-pox in intensity and extent. Purpuric rashes, however, are excessively rare, if they occur at all, in the first stage of the ordinary febrile affections; so that they are of chief moment among the prodromal exanthems of small-pox, and may be regarded as affording a tolerably certain basis for diagnosis. The general erythema, which is met with in a limited number of cases, is usually of the diffuse form, and, occurring on the second or third day, might be confounded with scarlatina. The points to be attended to in the diagnosis would be, the mode of attack, which in the two affections presents certain differences; the colour and extent of the exanthem, which is brighter in scarlet fever, and, as a rule, much more extensive; and lastly, the presence of minute petechiæ in the inguinal regions would be in favor of small-pox.

The diffuse erythema accompanied by numerous petechiæ which occurs on the second or third day in cases of malignant small-pox, could not be distinguished from the similar condition met with in those rare cases of hæmorrhagic scarlatina. The presence of an epidemic of one or other disease would be the only means of deciding the nature of the case.

Simon regards the prodromal exanthems as eminently charac-

teristic of small-pox, and among his cases, which are all of great interest, we met with some of special significance. Thus in the case of a girl who had had a rigor, fever, pains in the back and head, and initial rashes in several places on the extremities, though no eruption followed, the diagnosis of small-pox was made, and confirmed by the fact that the sister, who had acted as nurse, took the disease badly. He also records cases in which, with the outbreak of the prodromal exanthem, the temperature sank and the general symptoms subsided, coming on again with the appearance of the eruption, and finally subsiding on its completion. Whether from a diagnostic point of view we agree with this author's estimate of the value of these initial rashes or not, there can be very little doubt that in a limited number of instances they may be of considerable service, in enabling us to decide upon the nature of a case, and therefore take early precautionary measures for the isolation of the patient.

Of the value of the initial exanthem in the prognosis of the disease the opinions of authors differ. Simon makes the general statement, that, "among the severe and fatal cases of variola just as many were accompanied with prodromal exanthems as those without," and he regards their prognostic significance as *nil*. It struck me, however, in reading over his cases that the number of deaths was comparatively small.

Knecht in 115 fatal cases of small-pox met with the initial rashes only 15 times, and as this observer noted 104 instances, his experience supports the view that they are, on the whole, of favorable significance. He states that up to the 30th year they are of no prognostic value, but after this age they indicate a severe course, while in old age they are almost invariably of evil omen.

Of Scheby-Buch's 237 cases. 37 died; *i. e.*, about 15 per cent. His experience does not bear out Knecht's supposition, that after the age of 30 the prodromal exanthems are of serious import. Curschmann believes that the simple macular and erythematous rashes almost invariably precede varioloid, and states, that in many instances the number of pustules was in inverse ratio to the extent of the initial rash. On the other hand, the purpuric rashes, in his experience, especially those in the

regions of the groin, are almost always followed by variola vera. The 11 cases above reported do not support this view; the only fatal case among them was preceded by a simple erythematous rash of considerable extent and the other instance of an erythematous rash was not followed by varioloid. Not one of the eight instances of initial purpuric exanthem proved to be variola vera; they were all followed by the milder forms of the disease, two of them being varioloid.

Trousseau* states that while in natural small-pox the scarlatiniform rashes accompanied with purpura constitute alarming symptoms, they do not lead to an unfavorable prognosis in the modified form.

Professor Seef† believes that the scarlatiniform and rubeolic rashes precede as a rule benign cases, the hæmorrhagic variety the severe.

Hebra‡ holds that the appearance of the rash upon the abdomen is not "necessarily to be regarded as an unfavorable sign. These cases do, however, more often terminate badly than in recovery, and particularly when the affection passes beyond mere hyperæmia into hæmorrhage, when, in fact, a purpura rather than an erythema shows itself on the abdomen and on the thighs."

On the whole the presence of initial rashes in the majority of cases indicates a favorable termination, but it is evident from the foregoing statements that we cannot as yet lay down definite rules with reference to their prognostic value. In forming an opinion we must not rely on the nature and extent of the exanthem alone, but take into account the general symptoms, not, as Sydenham says "go by the external appearance only."

The prodromal exanthems it may be remarked occur with much greater relative frequency in men than in women.

A debated point has been, whether the small-pox eruption ever appears on the regions which have been affected with the initial rashes. In very many instances these parts present an entire

* Loc. Cit., Vol. II, p. 71.

† Journal de Médecin, Juin, 1875.

‡ Skin Diseases, Vol. I, p. 58.

immunity, which may be owing to the fact that the rashes occupy just those regions most commonly spared by the small-pox pustules. The lower abdominal and inguinal regions are rarely the seats of an abundant eruption, and often remain free, while the rest of the surface is involved to a considerable extent. I have several times seen isolated pustules develop in the hypogastric region after an initial rash.

Most authors refer the phenomena in question to disturbances in the vaso-motor nerves, caused, Simon supposes, by hyperæmia of the cord, which affects injuriously the vascular nerves, passing down from the medulla. "If," in his own words, "the affection of these nerves is wide-spread an erythema universale follows, while if limited to certain groups we notice circumscribed erythemas: and, as the chief site of the affection (hyperæmia?) of the spinal cord is in the lower dorsal and lumbar regions we have in the majority of cases the erythema confined to the lower parts of the trunk."

II. HÆMORRHAGIC SMALL-POX.

True hæmorrhagic small-pox occurs under two conditions; in one the characteristic symptoms come on early, either with or following close upon the prodromata; there are extensive cutaneous extravasations, with hæmorrhages from the mucous surfaces, and death ensues with a terrible certainty in from two to six days. This is the *purpura variolosa* of authors, the petechial, malignant, or black small-pox. In the other, the case progresses as one of variola vera, and it is not until the vesicular or pustular stage that hæmorrhage takes place into the pocks, and in some cases from the mucous membranes. This, which is almost as invariably fatal as the former, has been called by some

writers, *variola hæmorrhagica pustulosa*, indicating that the hæmorrhages occur at a later period of the disease.

The epidemic which has raged in this city for the past five years has been remarkable for the prevalence of this variety of the disease; and the present paper is based on 27 cases, 14 of which came under my own observation, chiefly at the General Hospital, while the remaining 13 were under the care of my predecessor, Dr. Simpson, to whose kindness I am indebted for permission to utilize them. The clinical history of the disease is well exemplified in the reports of the following cases.

I.—A. T., aged 6½, unvaccinated. Admitted at 2 p.m., July 14th. Had been ill since the afternoon of Monday, the 10th, with fever, severe pains in the back and head and vomiting.

Patient seen at 8.40 p.m. Pulse 144, tolerably firm; temperature 105°; respirations 26, the rythm broken by an occasional deep inspiration, or a series of shorter ones. Pupils dilated. Slight delirium. Tongue thickly coated, white, edges red. General cutaneous surface of a dusky red colour, especially marked in the face, and by careful inspection an exceedingly fine papular eruption was discovered, most evident on the face, less so in other parts. Scattered over the whole skin were numerous ecchymoses, from 1 to 3 lines in diameter, and of a dark red colour. They were most abundant about the neck, in the submaxillary regions, scattered on the extremities. A thickly set group existed over the left biceps. Ordered quinine grs. x, at 9.30. Very restless all night, raving and shouting; temperature at 3 a.m., 104.1, and at this time he had a second ten grains of quinine, shortly after the administration of which he vomited a little blood.

15th.—9.15 a.m.—Pulse 140, not so full; temperature 104°; respirations 18, and still irregular. Is sensible, but will not take nourishment. Ordered a cold pack. At 12 a.m., temperature 103°. 5.30 p.m., pulse 144; temperature 104.2°; respirations 32. On the back are many elevated wheals, and on the summit of these small groups of vesicles exist. The fine punctiform extravasations almost universal on the skin of the trunk. Lips

dry and cracked. Tongue darkly coated. Does not complain of his throat. Ordered a cold pack at 6 p.m., and quinine gr. x, at 9 p.m. To have morphia if sleepless.

16th.—Has been very restless all night, in spite of two draughts of morphia ($\frac{1}{4}$ gr. each). Pulse 140, weak but regular; temperature 103.2° ; respirations 18, more regular. Great restlessness and jactitation. The scattered papules are uniformly hæmorrhagic, and the wheals on the back and side, which yesterday were only hyperæmic, are now purpuric. At least one half of the cutaneous surface is the seat of extravasation and the free portions are of a dusky-red colour. Purpuric spots numerous about the face, and a few exist beneath the conjunctiva. The urine passed through the night is clear, though scanty. Has passed a considerable amount of blood per rectum, and also a small quantity of bloody urine. Surface of body darker, extravasations appear deeper and more abundant; on exposing the trunk, nothing is noticeable on the skin but the deep plum colour. Restlessness extreme, and slight delirium.

According to the nurse he became easier after 3 p.m., passed more blood from the bowels and bladder, and died at 5.30 p.m., having been in hospital a little over two days. Duration of illness about six days.

The above may be taken as a fair example of the disease in question, but it may occur in a more aggravated form, killing in from three to four days, and before the eruption has become at all evident.

One of the worst cases which came under my notice was of this description, and, as I saw it very frequently from the beginning to the close, I will give a short account of it.

II. On the evening of Thursday, Oct. 24th, 1874, I was sent for to see A. N., aged 22, a stout, well-built, young Englishman. I found him in a high fever, complaining of intense pain in the lumbar and præcordial regions, and incessant vomiting. He stated that he had been to the theatre the previous night feeling in his usual health, but that on awaking this morning he felt unwell, had a headache and nausea, and was unable to attend

to his business. He believed it to be biliousness, to attacks of which he was, at times, subject. On the left arm were two scars of an old vaccination.

25th, 9 a.m. — Found him in the same condition, having passed a very bad night. The vomiting and pains continue. Temperature 101° ; pulse 116, full and strong; face flushed, skin of chest erythematous. The præcordial pain was specially grievous, and I gave him an injection of $\frac{1}{2}$ a gr. of morphia in this region.

12 a.m. — Is a little easier, but the retching continues.

4. 15, p.m. — Skin of the trunk very hyperæmic, and a few isolated ecchymoses were noticed along the lower margins of the chest.

9. p.m. — Scattered spots of purpura exist also in the groins. Condition much the same, retching not quite so frequent. Pulse 112; temperature 102.4° .

T. 103° . 26th. — Passed a restless, uneasy, night. Skin of trunk much congested, that of extremities less so. Ecchymoses have extended, and are more numerous. In consultation with Dr. Howard in the afternoon, my suspicions were confirmed, and the diagnosis of small-pox made. On careful inspection a few small papules were discovered upon the wrists and forehead, near the roots of the hair. Still complains of the dull, aching pain in the back, and the vomiting continues every 15 or 20 minutes. In the evening he was removed to the small-pox wards of the General Hospital, and placed under the care of Dr. Simpson. Shortly after arriving there he vomited a little blood. 9. p.m. — The skin of the trunk is now almost universally purpuric, and the extravasations are extending on the extremities. Pulse 124, soft and compressible; respirations 26, interrupted, every fifth or sixth inspiration deeper than the others. Complains a little of his throat; soreness due probably to the constant retching. Still complains of the dorsal pains. A hypodermic injection of morphia was given in the lumbar region.

27th. — Passed a restless night. Hæmaturia and melæna towards morning. Hæmatemesis at intervals. Considerable

oozing took place from the puncture of the hypodermic needle. General symptoms a little improved. The lumbar pains much relieved. Cutaneous hæmorrhages are extending on the extremities. Pulse 140, and small; respirations 34; temperature 100.2°. Hæmorrhages from the bowels, stomach, and urinary passages continued through the day, and the symptoms became aggravated. 6 p.m.—Pulse 140, and almost imperceptible; respirations between 40 and 50, and interrupted. The mind, which up to this time had remained clear, now began to wander. The greater part of the skin of the body is ecchymotic. The face is somewhat swollen, dark purplish red in colour, and on pressing with the finger it is seen that colouration is due chiefly to the extravasations, which have also occurred round the orbits. The conjunctivæ are swollen and black, hæmorrhage having taken place beneath them; the corneæ appear sunk in dark red pits, giving to the patient a frightful appearance. The whole trunk is of a deep plum colour, hardly a trace of clear cuticle remains. The purpuric spots are thickly set, and between them are fine punctiform extravasations. On the extremities the petechial eruption is more scattered; still, even here, more than two-thirds of the cutaneous surface is the seat of hæmorrhage, and the whole skin is hyperæmic. The most careful inspection fails to detect any papules, even about the wrists or forehead, where on Friday evening they were appearing.

Just after midnight the respirations became more prolonged, pulse quite imperceptible, extremities cold, and death took place at 12.45 a.m. on Monday morning. The whole illness lasted hardly four days.

With the exception of two, all the cases of hæmorrhagic small-pox which I have observed were of the above type—the patients died before the characteristic eruption developed, or the cutaneous ecchymoses completely cloaked it. In two instances the extravasations did not come on in the initial stage, but during the development of the pox.—*V. hæmorrhagica puustlosa*.

The following is a brief history of one of these cases:

III. A. McR., aged 19, a well-built Scotch girl, unvaccinated. Admitted January 31st, 1875, from the general wards, where

she had been under treatment during two weeks for some ill-defined affection. Only six weeks previous to this she had been discharged from the Hospital convalescent from typhoid fever. In the general wards she had suffered with the usual initial symptoms of the disease. On admission, temperature 103.3° ; pulse 116; respirations 22. A deep erythematous rash exists over the whole body, most intense on the abdomen and thorax, unaccompanied by ecchymoses. A papular eruption is present on the face, thorax, and arms, and is just appearing on the legs. Patient dull, heavy, and does not respond to questions.

Feb. 1st.—9 a.m.—Temperature 102° ; pulse 110; respirations 26. Has passed a restless night; delirious at times, vomiting continues at intervals. Erythema persists. 6. p.m. Pulse 112; respirations 32; temperature 103.4° . Towards the afternoon the nurse states that a small amount of blood was vomited, and she also passed a little from the bladder and bowels. The eruption has extended, many of the papules have now vesicular tops. The erythema is not nearly so bright.

2nd., 9 a.m. — Temperature 102.3° ; pulse 100; respirations 26. The hæmatemesis has continued at intervals through the night. Slight hæmaturia. The bright erythematous rash has gone, the skin is now of a dusky livid hue. 6. p.m. Temperature 103.4° ; pulse 60, and intermittent every fourth beat, but is tolerably full; respirations 28. Cutaneous extravasations noticed for the first time, chiefly about the vesicles on the upper part of the chest, and on the legs. In many the hæmorrhage has occurred into the vesicles. The hæmorrhages from the mucous membranes have continued at intervals.

3rd, 8.30 a.m.—Temperature, 101° ; pulse, 112; respirations, 24. Most of the vesicles on the legs are now hæmorrhagic, and the ecchymoses have extended in the abdominal region. The vomiting is still a very troublesome symptom. 5.30 p.m.—Pulse, 120, not irregular; temperature, 102° ; respirations, 24. On the face and arms the pocks are developing slowly, and only a few in these parts are hæmorrhagic; melæna, hæmaturia and metrorrhagia (slight). Takes nourishment well.

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4th, 9. a.m.—Pulse, 120 ; temperature, 101.2° ; respirations, 28 ; says she feels better ; vomiting has stopped. Blood in the urine passed through the night. Pocks are not developing, look dark, and the majority of them are hæmorrhagic.

6. p.m.—Pulse, 124 ; temperature, 102° ; respirations, 36. The peculiar variolous odour very evident this evening.

5th, 8.30 a.m.—Pulse 116 ; temperature, 100° ; respirations, 18. Slept well, and says she feels much better. Melæna and hæmaturia through the night. Pocks much flattened at the top, and of a dark colour ; skin between them livid, and covered with minute extravasations. 6 p.m. Pulse, 112, very weak and intermits every tenth beat ; temperature, 101°. Is very dull and heavy, and does not care to take nourishment. Not much change noticed in the eruption, the majority of the pocks look like elevated hæmorrhagic papules, no umbilication in any of them. Through the evening she lost a good deal of blood from the vagina, got much worse towards morning, and died at 7 a.m., on the 9th day of the disease.

The details of the above cases furnish a tolerably accurate picture of the clinical features of this truly terrible disease, and I shall now proceed to make some general remarks upon its symptoms, diagnosis, etiology, and pathology.

Symptoms.—Satisfactory evidence is wanting as to the period of incubation in hæmorrhagic small-pox. Most writers state that it is the same as in the ordinary form, *i. e.*, 12 to 14 days. Zulzer,* however, states that it is shorter, having determined it in 9 cases to be from 6 to 8 days. In the majority of instances it is unaccompanied by any symptoms—perhaps slight languor and malaise—the disease breaking out suddenly in all its violence. So it was in the case above reported of the young Englishman. The day before the attack he had walked round the mountain. (5 miles).

The symptoms of the initial stage are those of the pustular form ; indeed, the disease may be regarded as an intensified and prolonged initial stage, combined with a remarkable tendency to cutaneous and mucous hæmorrhages.

The fever, pain in the back, and vomiting—that triple com-

* Berliner klinische Wochenschrift, 1872.

bination, which we look upon as almost pathognomonic of small-pox—are the prominent symptoms throughout, even after the characteristic extravasations appear.

The fever is usually moderate, varying from 101° to 103° ; only once did I observe a temperature of 105° . It is frequently ushered in with a rigor, or series of chills. The pain in the back is perhaps the most distressing symptom to the patient, and persists longer, and is more constant, in this than in the pustular form of the disease, continuing in some instances to within 12 hours of death. All of my patients complained of it, and when asked to localize it placed the hand over the sacrum. Præcordial pain was also common, in one or two cases much more severe than the dorsal. Headache is rarely absent during the first days of the fever.

Vomiting constitutes a very troublesome symptom, and, in my experience, proves exceedingly obstinate, much more so than in ordinary small-pox. It was very unusual for patients with the latter disease to vomit after the appearance of the eruption, while, in cases of the hæmorrhagic form, it continued for 3, 4, and 5 days. Dry retching was frequently combined with it, and seemed particularly distressing.

Early on the second day, or even in the most severe cases on the evening of the first, a bright scarlatiniform redness spreads over the skin of the trunk, sometimes extending to the extremities, but not often involving the face. In some instances this is not universal, but confined to the lower abdominal or lateral thoracic regions. It is difficult, or even impossible, to distinguish this general or localized erythema preceding hæmorrhagic small-pox from the similar condition which, as an initial rash, so frequently ushers in the ordinary or modified forms of the disease. For a time simply hyperæmic and disappearing on pressure, the character of the rash quickly alters by the occurrence of numerous extravasations, which begin commonly in the groins and lateral thoracic areas. At first punctiform or macular, and concealed by the general redness, they soon increase in size, and on the trunk form irregular patches, ranging in size from a six-pence to a penny, while on the extremities and face they remain discrete. In 36 hours the ecchymoses may have devel-

oped to such an extent as to involve fully two-thirds of the cutaneous surface. The skin of the trunk is now of a rich plum colour, and by pressure very slight difference is made in the intensity. Hemorrhage into the tissue of the eyelids and beneath the conjunctivæ is common, and adds greatly to the disfigurement of the face, already puffed and swollen. The extravasations deepen until the end, forming throughout the most distinguishing feature, and the one which has so justly given the name of black small-pox to this variety of the disease.

True papules of variola may nearly always be discovered, if carefully looked for upon the forehead and wrists at the end of the second or upon the third day. They were present in all the cases which came under my own observation. In the most malignant form—*purpura variolosa*—the rapidly extending ecchymoses soon hide them, and it may be difficult or impossible even to feel them; indeed, in several instances, I could not, *post mortem*, convince myself of their presence. In the other variety, *v. hæmorrhagica pustulosa*, the eruption comes out as usual, the extravasations occurring either in the vesicular or pustular stage.

Hæmorrhage from the *mucous membranes* takes place in the majority of cases, and constitutes one of the most prominent symptoms.

Epistaxis is common, especially in the early stage of the disease.

Hæmatemesis occurs in more than half of the cases. In my experience it is not copious, but the blood is mixed with the thick mucus brought up in the constant attacks of vomiting.

Melæna was noticed in about one-third of the cases; the blood in three was tolerably fresh and bright; as a rule, however, it was dark, and mixed with the mucous discharges.

Hæmorrhage from the *urinary passages* occurred in a large proportion of the cases, and was often profuse, the blood coagulating in the chamber-pot.

Metrorrhagia is stated to be exceedingly common in women. It was only noticed in one out of six females.

Hæmoptysis occurred in five cases, in one it was profuse and arterial. The spata hawked up are frequently streaked with blood from the bronchial tubes and fauces.

These hæmorrhages from the mucous membranes do not always occur. In five of my own cases (Nos. 16, 18, 20, 22, 23,) they were absent, and yet these were among the most severe and rapidly fatal cases of the disease, death ensuing on the 5th, 5th, 6th, 7th and 4th days respectively. In two, (Nos. 22, 23) *post mortem* examination revealed extensive hæmorrhages into the mucous membrane of the stomach, intestines, and urinary tract.

The *pulse* in the first days of the disease ranges from 110 to 120 beats in the minute, and is full and compressible. Gradually the arterial tension is increased, the pulse becomes more rapid, 120 to 140, small, hard, and irregular, and at last uncountable or imperceptible.

The *respirations* are unusually increased in frequency in the early stage, without any discoverable disorder in the lungs, and are out of proportion to the intensity of the fever. In the case of a negro whose respirations the morning after admission were 32, and the temperature 101°, after examining the lungs and finding nothing to account for the acceleration, my suspicions were aroused, and on careful inspection I was able, even on the dark skin, to detect the hæmorrhagic condition in and about the papules. This symptom alone directed my attention to his dangerous condition, which might otherwise have escaped observation, as there were no hæmorrhages from the mucous membranes. An interesting, and by no means unfrequent phenomenon, was the disturbance in the respiratory rhythm, first drawn attention to by Drs. Cheyne and Stokes, consisting in a series of superficial respirations, sometimes almost imperceptible, followed by a deep inspiration. This was noticed chiefly during the last 24 or 36 hours of life.

A short hacking cough was not an uncommon symptom. Many of the patients complained of sore throat, which, in some instances, appeared to be due to the constant gagging and vomiting, in others to a foul, horribly fœtid, diphtheritic pharyngitis.

Consciousness is commonly retained until near the end. In only six cases was delirium a prominent symptom. A hyperæsthetic condition of the skin, mentioned by Zulzer* as common, was not noticed in any of the cases.

* Loc. Cit.

In the true petechial form the patients seldom outlive the sixth or seventh day ; where the hæmorrhages do not come on until the vesicular stage, they, of course, last longer. The cases upon which this paper is based died on the following days :

1 on the 3rd day ; 2 on the 4th day ; 5 on the 5th day ; 6 on the 6th day ; 5 on the 7th day ; 4 on the 8th day ; 4 on the 9th day.

The disease, in both its forms, is spoken of as invariably fatal, and such has been our experience in the small-pox department of the General Hospital.

Diagnosis.—In an epidemic of small-pox characterized by the presence of hæmorrhagic varieties, there is rarely any doubt of the nature of a case of fever presenting extensive cutaneous extravasations, and, perhaps, mucous hæmorrhages. Given, however, an individual case, when no epidemic was raging, and the matter would not be so easy.

We must be careful, in the first place, to remember that the initial rashes, which so often precede the milder forms of the disease, may be general and purpuric, closely resembling, or identical in appearance with, those accompanying the true petechial variety. It might be impossible to decide definitely for 24 hours on the nature of a case of this kind. In the latter the erythema would probably be more intense, the ecchymoses more extensive, and the general symptoms more aggravated. In many instances the progress of the case would alone determine its nature.

The bright, rosy-red, rash appearing on the second day might be mistaken for the eruption of scarlet fever, unless the mode of onset of the disease had been carefully watched. The diagnosis between hæmorrhagic scarlatina—fortunately a rare disease—and petechial small-pox offers still greater difficulties. Close inspection might discover in the latter papules about the forehead or wrists, and, I think, the characteristic odour of small-pox, which is well developed in this variety, would aid in arriving at a conclusion.

Cerebro-spinal meningitis is another disease which, in some of its forms, is apt to be confounded with purpuric variola. The pains in the head and back in the latter simulate those of

meningitis, in which disease also cutaneous ecchymoses not unfrequently occur. Indeed, I have the permission of the physician in charge to state that in case 25 on the list the error in diagnosis was made. I remarked to him at the *post mortem* examination upon the similarity of the pathological changes to those in hæmorrhagic variola. The mother, who had nursed the child, a short time subsequently took small-pox, and died.

With true *Purpura hæmorrhagica*—the *Morbus maculosus Werlhoffii*,—this variety of small-pox has many points in common. In both there are cutaneous and mucous hæmorrhages, but in the former the extravasations begin on the lower extremities, the skin is not so hyperæmic, the fever not so high, and there may be œdema about the joints, diarrhœa, and ascites.

Etiology.—From the table subjoined some interesting facts with reference to the general etiology of the disease may be drawn.

It is most common between the ages of 15 and 30. Thus of the cases there were—

Under 10 years, 3; between 15 and 20, 4; between 20 and 25, 9; between 25 and 35, 6; between 35 and 45, 3; above 50, 1.

Young, vigorous, muscular persons form the majority of the victims, and this remarkable fact was noticed also in the late epidemic in Germany. (Zulzer, Ponfick). Several of my patients were above the average muscular development, most of them belonging to the artisan class. The predisposing causes mentioned by Aikman,* viz., sudden change of residence, debilitating nervous influences, unhealthy dwellings, were not specially observed.

Men appear to be more frequently attacked than women.

With regard to vaccination the table shows that 14 were unvaccinated, while 13 showed marks of a by-gone vaccination. In none was there a history of re-vaccination. That is, the whole of these cases were unprotected, for I hold that we have no right whatever to say that a man is *vaccinated* because he has cicatrices on his arm. The proof that these 13 were not vaccinated lies in the fact that they died of the worst form of small-pox. No properly *vaccinated* person, one in whose tissues the impress of vaccina persists, can, I maintain, take small-pox.

Similarly †Zulzer's cases, 35 in number, all showed scars,

* Glasgow Medical Journal, 1871, p. 60.

† Loc. Cit.

but none of them had been re-vaccinated. Other observers state that persons without cicatrices of a former vaccination form the majority, or even all, of the number attacked.

The proportion of hæmorrhagic cases has been unusually large in this epidemic, not only here but in other parts of the world; indeed, it has been the most virulent type of small-pox known since the beginning of the century.

In the small-pox department of the Montreal General Hospital there were admitted from Dec. 14th 1873, to July 21st 1875, one year and seven months, 260 cases. Of these 24 died of the variety under consideration, or 9.23 per cent.

Case.	Age.	Sex.	Unvac.	Vac.	Day of Death.	REMARKS.†
1	27	F.	.....	V [*] ₁	8th	Delirium. Hæmatemesis.
2	28	F.	.....	V [*] ₂	6th	Epistaxis. Melæna. Hæmoptysis.
3	29	M.	Unv.	....	8th	Delirium. Melæna.
4	53	M.	.....	V.	3rd	No papules evident. Died 3½ hours after admission.
5	20	F.	Unv.	....	6th	Epistaxis two days before.
6	19	M.	.....	V [*] ₂	7th	Slight convulsions.
7	35	M.	.....	V [*] ₂	9th	Hæmaturia.
8	20	M.	.....	V.	6th	Much Delirium. var. hæm. pust.
9	19	M.	Unv.	....	7th	No mucous hæmorrhages.
10	24	M.	Unv.	....	8th	Delirium. Melæna, frequent.
11	25	M.	Unv.	....	9th	Hæmatemesis. Melæna.
12	..	F.	.....	V [*] ₂	8th	Epistaxis. Melæna. Hæmatemesis.
13	23	M.	.....	V [*] ₂	7th	Var hæm. pustulosa. Hæmoptysis. Old lung disease.
14	22	M.	.....	V [*] ₂	4th	Hæmatemesis. Melæna. Hæmoptysis.
15	20	M.	.....	V	9th	Hæmatemesis. Melæna. Hæmoptysis.
16	21	M.	.....	V [*] ₁	5th	Var hæm. pustulosa. Hæmatemesis.
17	19	F.	Unv.	....	9th	Hæmatemesis.
18	44	M.	Unv.	....	5th	No mucous hæmorrhages.
19	24	M.	Unv.	....	5th	Hæmatemesis.
20	36	M.	.....	V [*] ₁	6th	Hæmatemesis. Melæna. Hæmoptysis.
21	6	M.	Unv.	....	4th	Delirium. No mucous hæmorrhages.
22	35	M.	.....	V.	7th	No mucous hæmorrhages.
23	16	M.	Unv.	....	4th	Hæmatemesis.
24	30	M.	Unv.	....	7th	Hæmatemesis. Melæna.
25	4	F.	Unv.	....	6th	Hæmatemesis.
26	36	M.	Unv.	....	6th	Hæmatemesis.
27	6	M.	Unv.	....	5th	Hæmatemesis.

* The figures indicate the number of scars.
† Cutaneous extravasations occurred in all.

Pathology—The condition of the internal organs in this disease has received a good deal of attention within the past few years. The remarks which I shall here make are based upon seven carefully performed autopsies.*

The prominent characteristics in all were the hæmorrhages into the various tissues and organs.

The *blood* during life was carefully examined in six cases, but no change of importance noticed in the corpuscles. Post mortem it was dark in colour and generally fluid.

In the *meninges* of the brain scattered ecchymoses were noticed in five instances. The venous sinuses of the dura mater and the vessels of the pia mater were full. In cases 21 and 22 thin coagula of blood existed on the surface of the pia mater. The *brain* appeared normal, the consistence remarkably good. In case 22 there was a small clot in the right ventricle. The *spinal cord* was examined in one instance, when nothing abnormal was found.

On the *pericardium* maculæ were present, often quite large on the visceral layer along the tract of the coronary vessels. The *heart* substance was firm, dark in colour; in several instances minute ecchymoses were observed on the endocardium, and in the muscular walls.

Both visceral and parietal layers of the *pleura* contained ecchymoses in 6 cases. The *lungs* were crepitant, and contained much blood in the posterior parts. In case 23 there was a patch of catarrhal pneumonia. In five instances apoplectic spots were found, none of them larger than a walnut.

The *spleen* in all was firm, about the natural size, in two a little enlarged. On section the substance was compact, smooth, of a dirty-purplish red colour, and in six of the cases the Malpighian corpuscles were remarkably enlarged, appearing as round white bodies on the dark background of the pulp.

The *kidneys* appeared of normal size. Ecchymoses on the capsule common; in one instance a thin clot existed upon the organ. The consistence of parenchyma was good. In three cases minute hæmorrhages had taken place into the substance.

* For two of these I have to thank Sister Rosalie, apothecary at the R. C. Civil Small-pox Hospital, who kindly informed me when any of these cases occurred.

The vessels as a rule were full. The *pelvis* of the kidneys in four instances were plugged with dark clots, which extended up into the calyces, and down the ureters. In all ecchymoses were present on the mucous membrane. In the mucous membrane of the *bladder* small hæmorrhages were met with on five occasions. In case 21 the walls of the whole organ were uniformly infiltrated with blood, not a trace of normal tissue could be seen on section.

The *liver* in five cases was of normal size, unusually dense and firm, lobules moderately distinct, of natural colour, and contained a good deal of blood. In two cases it was large, pale in colour, very friable, and on examination proved fatty. The general condition in both these cases accounted for the state of the liver, one had suffered from chronic disease of the leg, the other was a drunkard. Ecchymoses upon the capsule were common.

The mucous membrane of the *stomach* in all the cases showed an enormous number of extravasations, some small and capillary, others as large as a bean, and projecting on the surface. Similar appearances were found in the *small intestines*; in two instances the ecchymoses were most abundant in the ileum, in the others the upper region of the bowel was most affected. Peyer's glands were swollen and prominent in four instances. In the *large bowel* the extravasations were only noticed in three cases.

In two instances the *mesenteric glands* were uniformly infiltrated with blood, looking like dark-purple grapes. Extravasations occurred in all the cases in the *retro-peritoneal tissues*, about the aorta, along the iliac arteries, and about the lumbar nerves. In most they were small and confined to the adventitia and parts about the vessels, in one, however, quite a large suggillate was found in the region of the right psoas muscle. Similar appearances were noticed twice about the thoracic aorta.

Such are the chief pathological changes in the internal organs, and they correspond pretty closely to those described by Ponfick* in the Berlin epidemic. In addition to the hæmorrhages, the firm, dense condition of the heart and abdominal glands seems peculiar, and stands in marked contrast to the appearances of these organs in *variola vera*, in which they are swollen, soft

Berliner klinische Wochenschrift, 1872.

and friable, and in that state of cloudy swelling common to prolonged fever. So impressed is Ponfick with the pathological and clinical differences between these extremes of small-pox, that he is inclined to group them as distinct diseases. But, just as transitions are met with clinically between the macular hæmorrhagic form and that in which extravasations take place in the vesicular and pustular stages, so also, I think, in a more extended series of post mortem appearances would be found intermediate between the extremes, and where the disease had lasted any time the same pyrexial changes would occur. Indeed, Curschmann* states that he has noticed them in *variola hæmorrhagica pustulosa*.

On the intimate pathology of this disease I can offer no suggestion. We are, as yet, profoundly ignorant of the conditions of its genesis, and do not know whether it depends on the intensity of the poison or the extreme susceptibility of the patient.

Most histologists are agreed that in these purpuric disorders the red corpuscles pass through altered or thinned and not ruptured vessels, but as to the causes of this general *diapedesis*, as the process is called, we have no data upon which to form a judgment.

The *treatment* of the disease is eminently unsatisfactory, the patients almost invariably die. A few instances are recorded of recovery from *variola hæmorrhagica pustulosa*. All the usual medicines indicated under these circumstances were tried, gallic acid, ergot, turpentine, acetate of lead, &c., without the slightest benefit. Quinine was used in large doses, and in three cases I used the cold pack.

Since the closure of the wards I have met with an article in the *Glasgow Medical Journal* by Mr. Aikman, formerly assistant medical officer at the Hampstead Small-pox Hospital, in which he recommends strychnia in large doses, and states that under this treatment many of these cases recovered. He gives as much as a drachm and a half of the liquor strychniæ in the twenty-four hours in severe cases, combined with iron and quassia.

* Ziemssen's Encyclopedia, Vol. II., Art. Small-pox. p. 387.
Loc. Cit.

A FORM OF HÆMORRHAGIC SMALL-POX.

Six cases of a modified hæmorrhagic form came under my notice, which present common features and peculiarities, and are, I think, worthy of record. They were all characterized by hæmorrhages into and about the pocks—chiefly those of the lower half of the body—in the vesicular stage. This, instead of being as it was at first regarded an ominous symptom, was followed by abortion of the eruption and speedy recovery. The following was the fourth case observed:

J. G., æt. 27. Vaccinated, one indifferent mark. Admitted June 8th. Eruption appeared on the 5th, and is present as a tolerably plentiful crop on the face, more scattered on the trunk and limbs. A few petechiæ exist in the groins. Symmetrical clusters of papules are observed about the middle of the inner surfaces of the tibiæ, upon the internal mæcoli, and also on the inner edges of the soles of the feet. General symptoms good. Pulse 106, full and strong; temperature 99° .

9th.—Vesiculation proceeding normally in the papules on the face, which is becoming much swollen; the neck also is very large, almost obliterating the angle of the chin. Hæmorrhages have taken place around many of the vesicles on the legs and thighs, the areolæ of hyperæmia have become purpuric, and a similar condition is observed about several on the arms. Pulse 96; temperature 99.5° .

10th.—According to the nurse he was a little delirious at times. Pulse 88; temperature 99.2° .

11th.—Almost all the pocks upon the limbs and abdomen are purpuric, those upon the face show no signs of pustulation, but have become firm and hard.

12th.—The 8th day of the eruption; appearance in the evening was as follows: Face and neck much swollen, eyes almost closed. Varioles isolated, yet nearly in contact, of a firm, hard feel, and of a semi-opaque, somewhat translucent

aspect. No true pustule is present, with the exception of a few about the roots of the hair,—but the face has a rough nodular appearance. Over the legs, arms, and to a less extent the trunk, there are numerous small, dark-red spots, about the size of a pin's head, which on superficial examination, looked like purpura, but on closer inspection prove to be small papules into which extravasation has taken place. On passing the finger over them a slight hard elevation can be felt, and in some a small semi-opaque, vesicular top is observable. Other larger ones, the size of a split pea, flat, with vesicular tops, and situated upon hæmorrhagic bases, are common on the legs. Here and there over the trunk and arms true pustules occurred but they are small and have not hyperæmic bases. The symetrical clusters, mentioned as situated on the legs, are elevated into bulla filled with a sero-sanguineous fluid which gives to them a bluish look. Upon the walls of the bullæ the remains of the septa of the original vesicles are distinctly seen. The separate varioles of the clusters on the tibiæ have not coalesced, though they are filled with a fluid of the same character. Another large bullæ filled with a sero-sanguineous fluid exists on the radial side of the ball of the left thumb. The bases upon which these various clusters and bullæ are situated are hæmorrhagic. Examination of the contents of the bullæ and of the larger pocks of the legs showed a large number of normal-looking red-blood corpuscles, and numerous granular leucocytes, many of which were grouped together. The sharply-defined, dark-red spots scattered over the white skin gave a remarkable appearance to the eruption. General symptoms good. Pulse 86; temperature normal.

14th.—Desiccation proceeding in most of the pocks, and those of an hæmorrhagic character present small dark scabs, (representing the contents of the vesicle) situated upon a base of fading extravasation. A few genuine pustules exist upon the chest. Face not so much swollen, but remains rough and uneven from the dry hard pocks. Temperature normal. Got up for a short time.

16th.—Eruption drying up rapidly.

17th.—Temperature rose to 102° this morning, due apparently

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to inflammatory action in the submaxillary region of the left side. Temperature subsided in the evening.

19th.—Up most of the day and has had a bath. Bullæ on legs and feet have dried up to large dark scabs. Convalescence from this date rapid; the hard nodules left upon the face took a long time to absorb.

It is needless to give the other cases in detail. They correspond in all essential particulars with the one here reported (the sanguineous bullæ excepted which were only noticed once), and I pass to the consideration of one or two interesting points in connection with them.

In all the eruption was tolerably abundant, especially on the face. All had been vaccinated, but only cases I. and II. presented a good mark each. The character of the eruption differed somewhat from the ordinary type. In cases I, II, III and IV, and to a lesser degree in case V, the vesicles were small, miliary in appearance, like the variety of small-pox described as *variola crystallina* or *miliaris*. The time of appearance of the extravasation was tolerably uniform in each case, viz., at or about the period of vesiculation. The day of the eruption on which it took place in the cases is as follows, in order, 4th, 5th, 4th, 5th, 4th, 5th, 4th. This corresponds closely with the stage in the development of the pock, when the most active hyperæmia takes place about it; for it is just in the transition of the vesicle into the pustule that the greatest demand is made upon the capillaries to supply the leucocytes or white blood corpuscles, which to a large extent constitute the formed elements of the latter. The extravasations took place chiefly about the pocks on the lower extremities and trunk, but they were not confined exclusively to these localities, being met with also in two instances about those on the arms.

Curschmann* very properly cautions against regarding those as cases of *var. hæmorrhagica pustulosa*, where patients being delirious get up and wander about, and hæmorrhages are found to have occurred in the pustules of the lower extremities in a simple mechanical manner. In the cases I refer to such a cause may

* Loc. Cit. p. 370.

be excluded, and the extravasations took place in the vesicular stage.

Next to the occurrence of hæmorrhages the abortive nature of the eruption forms the most interesting feature. No patients under my care with an equal extent of eruption made such rapid recoveries. In all of them the skin was perfectly clear of scabs in about two weeks, the extremes being 11 (case VI) and 14 days (case III). It is difficult to assign a cause for this early desiccation. On the legs and lower abdominal region it may have been directly due to the extravasation. A vesicle with a layer of extravasated blood about and beneath it is cut off, so to speak, from the circulation, and has to draw its nutritive supply from a distance. In many instances, also, the hæmorrhage occurred into the vesicles, and they quickly dried up to small dark scabs. On the face and other parts this condition was absent, or present to a very slight extent, so that this factor cannot here be taken into consideration. In three the retrogression of the pocks on the face produced typical examples of the form *v. verrucosa*; solid papules, like small warts, were left, which took a considerable time to disappear, even after the rest of the body was quite free.

An arrangement of pocks in clusters—*v. corymbosa*—was noticed in three cases. In case I symmetrical groups of exceeding by fine vesicles were present on the eyelids, and similar ones, though not so distinct, were on the cheeks. Case II presented several curious clusters, also of small vesicles, on the thighs and in the popliteal regions. In case V—the one above given—they occurred on the inner surfaces of the tibiæ, on the internal maleoli and on the inner sides of the soles of the feet. The individual pocks on the maleoli and soles fused together forming large blebs, which became filled with a sero-sanguineous fluid. This variety is usually regarded as very fatal, but in these cases the arrangement appeared to have no special significance.

The references I have been able to find to this variety of hæmorrhagic small-pox are exceedingly limited. The 35th case in Simon's articles* on prodromal rashes presented hæmorrhagic rings round the pocks. Cases 20 and 21 in Knecht's paper on

* Lo. Cit. p. 2.

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the same subject are similar. He speaks of hæmorrhages into and about the pocks, with abortive retrogression and rapid desiccation of the eruption.

Webb in the Boston *Medical & Surgical Journal*, (Aug. 1873.) writing on the late epidemic in that city, states "that there were a few cases which had a hæmorrhagic tendency in the earlier stages of the disease, but the eruption abated early, and the patients recovered." Ogston, also, in the *Medico-Chirurgical Review* (Jan. 1873) speaks of the bases of the pocks becoming the seat of extravasation. These cases appear to have been common in Hamburg during the late epidemic, and the only notice worthy of the name is to be found in an article by Dr. Scheby-Buch in the 5th vol. (1874) of the *Archiv. f. Dermatologie und Syphilis*. Under the term "Hæmorrhagien mit Pocken."—Hæmorrhages with Pocks—he describes a group in which no doubt the cases here referred to are to be classed. He says, "under this heading I reckon the cases in which the hæmorrhages take a subordinate position. The pocks are tolerably numerous, here and there confluent, mostly flat and imperfectly developed. Hæmorrhages occur in and about the same on the lower extremities. Sometimes these are accompanied with free extravasations (purpura) in the skin and conjunctiva, but hæmorrhages from the remaining mucous surfaces never occur." Unfortunately none of the cases are reported, many of them, however, were of a severe type and fatal. I did meet with one case in which hæmorrhages occurred about the pocks on the thighs, legs, and, to a less extent, the thorax in the vesicular stage. Instead of the eruption aborting it went on to maturation, and the man barely escaped with his life. Instances like this may have furnished the fatal contingent in Scheby-Buch's cases, and no doubt in a large experience cases would be met with which might supply the links to unite the mild variety here described with the fatal *variola hæmorrhagica pustulosa*.

It will be sufficient if attention has been drawn to the fact, not generally known, that cases of small-pox in which cutaneous hæmorrhages occur into and about the pocks are not of necessity fatal.

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VERMINOUS BRONCHITIS

IN

DOGS.

(READ BEFORE THE MONTREAL VETERINARY MEDICAL
ASSOCIATION, MARCH 29TH.)

BY

WILLIAM OSLER, M.D., L.R.C.P. LOND.,

FELLOW OF THE ROYAL MICROSCOPICAL SOCIETY, LONDON; VICE-PRESIDENT
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VETERINARY COLLEGE, MONTREAL.

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1877.

another, and has been restricted in its generic meaning to forms
congeneric with its type species, *Strongylus equinus* Mueller, 1784,
from the large intestine of Equidae. The subgenus *Strongylus* is

See + to Cushing & Flerow in 1921. Form 1853
is the "1815" form, which probably came from
it instead of the "1815" form.

another, and has been restricted in its occurrence, meaning to form a congenetic with its type species, *Strongylus equinus* Muller, 1784, from the large intestine of Equidae.

Sent to Cushing by Flaherty in 1921. Found 1953
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TWO NEW GENERA OF NEMATODES, WITH A NOTE ON A NEGLECTED NEMATODE STRUCTURE.

By MAURICE C. HALL,

Senior Zoologist, United States Bureau of Animal Industry.

In this paper two species are removed from two large genera, in which they do not belong, for the sake of accuracy and convenience, the present names being erroneous and misleading, and the species of such economic interest as to make accurate naming desirable. A very distinctive structure, present in one of these worms, has been

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This worm is designated as *Ostertus ostleri* (Cobbold, 1879) Hall, 1921.
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Strongylus rubidus Hassall and Stiles, 1892, from the stomach of
swine.

This species belongs in the superfamily Strongyloidea, but not in
the genus *Strongylus*. This genus in the old extended sense contains
at present over 350 specific names and variations of one sort and
another, and has been restricted in its accurate meaning to forms
congeneric with its type species, *Strongylus equinus* Mueller, 1784,
from the large intestine of Equidae. The superfamily Strongyloidea, 1.11

head is without papillae. Milks agrees with Neumann's description of it as having two or three prominences or concentric lips, behind which there are three papillae; according to Blumberg, the head bears several papillae; according to Rabe, the mouth is surrounded by two or three concentric folds, and near it there is one large eminence with two smaller ring-shaped ones behind it). The male has two unequal yellowish spicules. (The inequality is not very great, as is the case in species of the genus *Filaria*, since the type species of *Ostertus* has spicules 48 and 56 μ long). The posterior extremity of the male is bluntly rounded, according to Rabe; somewhat pointed, according to Osler; or somewhat pointed and slightly bent, according to Blumberg. The female has a rounded tail end and the vulva is very close to the anus (Rabe says just anterior to the anus, and Milks agrees with this; Blumberg says 20 μ anterior of the anus, and Milks agrees with this; vulva open to the exterior by a cloaca, or common channel). The worms are ovoviviparous, the eggs hatching in the uterus, giving rise to embryos which are blunt anteriorly and pointed posteriorly. The only known species occurs in the trachea and bronchi, apparently in the pulmonary parenchyma also, of the dog.

Type species.—*Filaria ostert*? Cobbold, 1879.
The fact that this worm is ovoviviparous would suggest an affinity with the Filarioidea. Its location in the lining of the respiratory tract and the presence of the vulva directly in front of the anus excludes it from the Filarioidea and relates it to the Spiruroidea near the Gongyl-oneminae, which also have the vulva close to the anus. The fact that it is ovoviviparous does not fit in well with the known members of the Spiruroidea, but as there is more or less variation in the matter of depositing eggs or bearing embryos within the limits of the larger groups, this may be regarded as a variation within the reasonable definition of the superfamily, the worm being regarded as an aberrant development.

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See + to Cushing by F. Osler in 1921. Found 1953
in the "1875" folder, which probably accounts for C. not naming
it, instead of the 1877 one in the life manuscript # 8-303.
L.H.B.

TWO NEW GENERA OF NEMATODES, WITH A NOTE ON A NEGLECTED NEMATODE STRUCTURE.

By MAURICE C. HALL,

Senior Zoologist, United States Bureau of Animal Industry.

In this paper two species are removed from two large genera, in which they do not belong, for the sake of accuracy and convenience, the present names being erroneous and misleading, and the species of such economic interest as to make accurate naming desirable. A very distinctive structure, present in one of these worms, has been found to be frequently present in nematodes, but apparently overlooked or misinterpreted. It is given the name of "telamon" in this paper.

One of the species for which a new genus is necessary is *Filaria osleri* from the trachea and bronchi of the dog. This species was originally called *Strongylus canis bronchialis* by Osler in 1877, but as it has none of the distinctive characters of *Strongylus* in even the broad sense in which that term was used by the older zoologists, and as it has a trinomial name instead of a binomial name, it was renamed *Filaria osleri* by Cobbold in 1879. At the present time there are over 900 specific names and variations in the genus *Filaria*, and *F. osleri* is so remote from the type species, *F. martis* Gmelin, 1790, from the mink, that the worm ought not to be placed in the superfamily Filarioidea. I have been unable to obtain specimens of this worm for study, and the existing descriptions are unsatisfactory, but the fact that the worm has so little in common with *Filaria* makes it advisable to remove it from this genus. As it does not seem to fit any existing genus, I am proposing a new genus for it, naming the genus in honor of the late Dr. William Osler, who discovered the worm and after whom the species is named. Tentatively the worm is referred to the superfamily Spiruroidea.

OSLERUS, new genus.

Generic diagnosis.—Spiruroidea: Small worms (up to 1.5 cm. long according to Raabe). Mouth structure uncertain; probably without distinct lips (according to Osler the mouth is simple and the esophageal

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VERMINOUS BRONCHITIS IN DOGS.*

By WILLIAM OSLER, M.D., L.R.C.P. Lond.; Fellow of the Royal Microscopical Society, London; Vice-President of the Montreal Veterinary Medical Association; Professor of Physiology in McGill University, and in the Veterinary College, Montreal.

EARLY in the month of January I was asked by Principal McEachran, F.R.C.V.S., to aid him in the investigation of a disease which had broken out among the pups at the kennels of the Montreal Hunt Club, and which was believed to be of a pneumonic nature. On proceeding to the place we found that the affection was confined almost exclusively to animals under eight months old, and that it had already proved fatal in several instances. At the time of the visit only one pup was ill, presenting symptoms of diminished air space in the chest. In order to ascertain the exact condition of the lungs, one of the pups, which had died a day or two previously, and had meanwhile frozen stiff, was ordered to be sent to the veterinary college for dissection. On the following day it was found at the autopsy that in addition to the pneumonia there were numerous small parasite worms in the trachea and bronchial tubes. Knowing how subject many of the lower animals are to bronchial strongyles, I did not think it very remarkable that they should occur in the dog. On referring, however, to Dr. Cobbold's list of entozoa infesting the dog, I was surprised not to find a bronchial strongyle mentioned, and a further search through the standard works on veterinary medicine and helminthology proving fruitless, I then wrote to the editors of the *Veterinarian* asking for information on the subject. They very kindly replied in a short editorial note in the March number, stating "that," so far as their knowledge extends "no such cases have been placed formally on record," but Dr. Cobbold tells them "that one such instance has been verbally brought under his notice, though not in such a way as to be thoroughly convincing."

* Read before the Montreal Veterinary Medical Association, March 29th.

I shall proceed now to speak of the symptoms and pathology of the disease, then give a description of the parasite itself, and make a few general remarks.

Symptoms.—Only five of the diseased animals were seen during life, and that rather irregularly, on account of the distance of the kennels from the city. However, I have obtained some important details from the keeper, and a case which was brought to the infirmary and kept for some time was made the subject of clinical study.

Among the initial symptoms disinclination for food and exercise, together with an unsteadiness of gait, amounting in some of the cases to a subparalytic condition of the hinder extremities, were the most evident. In fully half of the cases convulsions occurred. There was rarely diarrhœa or any other symptom referable to gastro-intestinal disorder. Cough was not a prominent symptom, being absent in many of the cases. When present, it was short and husky, "not," as the keeper said, "the regular distemper cough." In the case brought to the infirmary the cough was well marked, and was dry and short. The pulse and respirations were increased, and the temperature elevated. Towards the close all food was refused, and even when fed the soup given was commonly vomited. Death took place in most instances quietly, though sometimes during a convulsion, and the keeper noticed that the pups which lasted the longest had the most fits. The duration of the disease ranged from three days to a week, or even ten days. The whole epidemic lasted about seven weeks.

Altogether fifteen couples were attacked, all of which, with the exception of three couples of old dogs, were under eight months old. Of the old dogs three had the disease badly, but only one died. Of the total number affected four and a half couples recovered, so that twenty-one animals were lost. The dogs which recovered are now in their usual health, though not in such good condition as they were before.

With regard to the hygienic surroundings of the animals it may be stated that, at present, the kennels are in an old house which stands by itself on the government property known as Logan's farm, at the east end of the city. It is isolated, being at some distance from any other building, and is situated on an elevated ridge overlooking the Quebec suburbs.

The disease showed itself during a remarkably cold spell; indeed, for the first three weeks of the epidemic, the thermometer was almost constantly below zero. It was first observed in two

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or three pups of four couples which were kept by themselves in a separate room, 14 ft. by 8; the floor being covered with straw, which was changed every week. There was a cupboard in the room, and in this the pups slept. This room was on the exposed side of the house, and, according to the keeper, was always very cold. The rest of the animals were kept in tolerably roomy quarters, though at night, with the doors closed, I do not think the ventilation would be sufficient. During the day they had free access to a large yard. The food consisted of porridge and cooked horseflesh, which were given either separately or boiled together. They got nothing else. The oatmeal was of good quality, nor did I find in portions of the food removed from the feeding pans anything which afforded the slightest clue to the origin of the disease.

Pathology.—*Post-mortem* examinations were made in eight cases. The following notes were dictated at the time.

CASE 1.—Autopsy eighteen hours after death. Body that of a well-nourished, half-grown, fox-hound bitch. On opening the thorax the lungs only partially collapse; the lower borders of the lobes are firm to the touch and dark in colour. The vessels in the lower mediastinum look full, and the tissues in that region are blood-stained. Pericardium natural; heart appears of normal size; right auricle filled with dark grumous clots, which extend into the vessels and are here decolourised. Right ventricle distended with dark, semi-coagulated blood; the conus arteriosus is filled with a perfectly decolourised clot, which passes into the pulmonary artery to the third and fourth divisions. The left auricle contains a small coagulum. The left ventricle contains no blood, but the whole cavity is occupied by a firm milk-white thrombus, which is connected through the mitral valve with the one in the auricle, while a prolongation from it extends into the aorta.

Lungs.—After normal, on inverting them, a quantity of dirty brown frothy fluid escapes through the larynx.

The anterior and middle lobes and the anterior half of the posterior lobe of the right lung are solidified, being of a dark reddish-brown colour, and contrasting strongly with the unaffected parts. The pleural surfaces are smooth, and there is no exudation. On section the lung tissue is of a dark red colour, the surface of the section finely granular, and bathed with a quantity of reddish-brown serum. On close inspection it is seen that the air cells are uniformly filled a solid exudation; attempts

at inflation of the affected portions with are unsuccessful. Portions excised sink at once when placed in water. In the left lung the apex of the anterior lobe, the whole of the middle, and the root of one of the posterior lobes, are in the same condition. The portions of the organs not diseased are of a rosy red externally, and on section contain much blood and frothy serum. Between the healthy and diseased parts there is a zone of intense hyperæmia.

Trachea.—On slitting up the windpipe the mucous membrane is found covered with a dark frothy mucus. The membrane looks pale and natural to within an inch of the bifurcation, but at this point it becomes reddened, and uneven from the projection of irregular little masses of a greyish-yellow colour, which on close inspection are found to be localised swellings of the membrane, containing small parasitic worms, the white bodies of which can be seen lying upon and partially imbedded in these elevations. They are most abundant just at the bifurcation, at the lower part of which several have emerged, forming an elevation three or four lines in height. About the orifices of the second divisions these little masses are also seen, and the whole mucous membrane of this region is deeply congested, and somewhat swollen. Very few of the worms are found lying free on the mucous membrane; almost all of them are attached to the masses or buried in them. The smaller tubes, especially those leading to the diseased portions of the lungs, are filled with a dirty brown fluid, and on squeezing any portion of the organ quantities of it can be expelled.

The *bronchial glands* are swollen and enlarged.

The *spleen* appears healthy.

The *left kidney* contains a large amount of blood; otherwise looks natural. Nothing unusual in the right one.

The *stomach* contains a few ounces of dark brown fluid; mucous membrane is pale. Large veins full.

The *duodenum* contains a bile-stained mucus, and on pressing the gall-bladder, bile flows from the papilla biliaria.

Jejunum and *ileum* contain a dirty black material adhering to the mucous membrane.

One *tænia elliptica* and one *ascaris marginata* are found in the jejunum.

Large bowel healthy.

Liver firm, dark red in colour, lobules indistinct, hepatic veins full, gall-bladder contains a small amount of bile. There is a clot in the portal vein.

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Brain.—Nothing abnormal about the membranes. Substance of good consistence and apparently healthy.

In the following cases I have condensed the original account.

CASE 2.—A five months' old dog pup, which had been ill a week.

Extensive pneumonic consolidation of the lungs, involving the lower part of the anterior lobe, and scattered patches in the middle lobe on the left side, and half the posterior lobe on the right. On section the solidified parts presented the appearance already described in the preceding case, and the unaffected portions are in a state of engorgement. On slitting up the trachea and bronchial tubes much frothy blood-tinged serum escaped, but no trace of any parasites can be found either in the tubes or parenchyma of the lungs. No ova or young parasites can be found in the blood of the cavities of the heart or of the pulmonary artery.

Abdominal viscera appear healthy, though, owing to the obstruction in the lesser circulation, the blood-vessels are engorged. A few ascarides in the intestine, and one small *tænia elliptica*.

CASE 3.—Dog pup, six months old.

In the left lung there are scattered patches of pneumonia in the anterior lobe, one or two are in the middle lobe, and half a dozen, the size of marbles, closely set together in the upper part of posterior lobe. In the right lung the anterior lobe is solid in an area 3" by 1", extending along the lower free border, and through the whole thickness. Small patches occur here and there over the other lobes. In this instance the inflamed spots are smaller, and not so extensive as in the other cases. On slitting up the trachea the mucous membrane looks healthy to within 2" of the bifurcation, when it becomes swollen, dark red in colour, and thickly scattered over with the elevated granular masses noticed in the first case, attached to and in which numerous small white worms can be seen. A stream of water of considerable force does not wash them away, but shows that each little elevation consists of a nest of the parasites. They extend to the tubes of the second order, and are specially abundant at the bifurcation itself, and about the orifices of the first tubes given off from the main bronchi. The small tubes are filled up with a frothy serum. Two of the worms are found far in the mucus.

Stomach and intestines appear healthy, except the lower portion of the ileum, which is congested.

In this region ten specimens of *dochmius trigonocephalus* occur, and further up in the bowel eight ascarides.

CASE 4.—A six months' old dog pup brought to the infirmary and died the next day.

In the left lung the anterior and middle lobes and the lower free border of the posterior lobe are solidified.

In the right lung the lower three fourths of the anterior and middle lobes, and the lower fourth of the posterior lobe, are in the same condition. Pleural surfaces involved. The posterior half of the windpipe contains upon the mucous membrane of its lower wall about a dozen small red patches, which extend in the axis of the tube; some appearing like linear streaks due to the injection of a few vessels. In all of them the presence of parasites can be determined, though in some of the smaller only one is found. They become more numerous about the bifurcation and in the main bronchi, occupying chiefly the lower wall. The masses are isolated and the mucous membrane between them intensely injected. None are found in the second divisions of the tubes.

Abdominal organs contain a good deal of blood. Mucous membrane of stomach and intestines look healthy. The large bowel contains a quantity of consistent feces. Six ascarides in the duodenum; six specimens of *doehmius trigonocephalus* in the jejunum, and ten specimens of *tricephalus affinis* in the cæcum.

Blood of heart and veins examined; nothing abnormal found.

CASE 5.—Seven months' old bitch pup. Considerable emaciation. Scattered areas of pneumonia throughout both lungs; not quite so extensive as in Case 4, but presenting similar characters. From an inch in front of the bifurcation of the trachea to the bronchi of the second order, the whole mucous membrane is transformed into an irregular greyish-yellow granular structure, upon which the bodies of numerous white worms can be plainly seen. Two sizes may be distinguished, one longer and of a more opaque white, which subsequent examination showed to be the female, the other shorter, thinner, and paler. In this case, even about the orifices of the third division of the bronchi, a few nests of the parasite can be seen. In the mucus from the smaller tubes a few of the adult worms occur, and on spreading it out on glass slips, and examining with a low power, a few ova and free embryos are seen.

Blood of heart and veins contain no parasites.

Nothing abnormal in the stomach or intestines, a large specimen of *tania elliptica* in the latter, also a few ascarides.

CASE 6.—A thin, badly nourished dog pup, six months old.

VERMINOUS BRONCHITIS IN DOGS.

7

Lungs present numerous patches of consolidation, involving on the right side the lower half of the anterior lobe, and a large piece of the posterior lobe. On the left side the free borders of the anterior and middle lobes for almost two inches from the margin, and a broad strip along the upper part of the posterior lobe.

Trachea and bronchi healthy; mucous membrane of the tubes in the affected parts congested, but no parasites in the membrane or in the lung tissue.

Stomach and intestines appear natural; a few ascarides in the latter. Nothing abnormal found in the blood.

CASE 7.—Dog pup, seven months old. The autopsy, which was made at the same time as the previous case, reveals a similar condition of the lungs, and an entire absence of any parasites either in the tubes or in the parenchyma of the lungs. Nothing unusual in the abdominal organs. The *tænia elliptica* and five or six ascarides in the jejunum.

CASE 8.—A fine, well-grown dog pup, eight months old. Had been ill a week.

Lungs contain pneumonic areas of considerable extent; in the right involving the entire apex with the dependent border, and a small portion of the posterior lobe near the diaphragm. In the left lung almost the whole of the middle lobe, and the root of the posterior, are specially affected.

On opening the windpipe the discrete elevations above described upon the mucous membrane about the bifurcation are very distinct, and the worms can be seen in them. The appearance is very like that met with in Case 4, and the description need not be repeated. No parasites in the intestines. Nothing abnormal found in the blood.

The general and specific characters of the worm may be defined as follows:

Strongylus canis bronchialis.—A slender nematode helminth, body filiform, the female measuring about one fourth of an inch in length, the male smaller, measuring one sixth to one eighth of an inch; head conical, mouth simple, unprovided with papillæ; tail of female obtuse, anal and generative orifices terminal, opening by a cloaca; ovarian tube containing one row of eggs, which, in the mature species, have developed into slender-coiled embryos; tail of the male somewhat pointed; penis consists of a double spiculum of a yellowish-brown colour; mode of reproduction viviparous.

Only occasionally, as stated above, were the worms found lying

free upon the bronchial membrane; as a rule they lay imbedded in a localised granular swelling of the mucosa, from which portions



FIG. 1.—Head of male worm.



FIG. 2.—Tail of female worm, showing the young embryos.

of them protruded. They could readily be pulled out with a pair of fine forceps, but a stream of water did not wash them away. In several of the cases examined (more especially Case 4) the whole mucous membrane of the affected part appeared rough and irregular, as if ulcerated, and innumerable parasites lay upon and in it. The mature females could easily be distinguished, not only by their larger size, but by the opaque whiteness of their bodies. The majority of the female worms examined were immature, and did not contain developed ova. The males were not nearly so numerous as the females. Forms intermediate between the adult worms and the young embryos (some of which, as already mentioned, existed free in the mucus) were not met with.

The occurrence in the bronchial tubes of the lower animals of nematoid worms belonging to the genus *strongylus* is by no means uncommon. Owing to the irritation caused by their development in the mucous membrane an inflammation of the tubes is produced, hence the affection is known by the names of parasitic or verminous bronchitis, popularly called "husk" or "hoose." It is not altogether unknown in man, but very few instances are on record. Infesting the domestic animals there are three well-recognised species of *strongylus*: the *S. filaria* of the sheep and goats; *S. paradoxus* of the pig, and *S. micrurus* of the calf, more rarely of the horse and ass. In calves and lambs parasitic bronchitis often constitutes a serious and fatal epidemic, so much so that in the latter it goes by the name of *the lamb disease*. So far as I know, no epidemic of the kind has been noticed in Canada. The species I have here described differs in several particulars from either of the above mentioned, and is most probably new to science.

The origin of the epidemic must, I am afraid, like that of so many other diseases, remain obscure. We have absolutely nothing to aid us in forming an opinion on the subject. There had been no change in the locality nor in the food. The straw upon which the dogs slept was of the ordinary kind, and the usual attention had been paid to changing it and also to the general sanitary condition of the place. The disease broke out, too, during a spell of very severe weather, when the food left in the pans froze quickly. The course of the epidemic was short, lasting between six and seven weeks, a sufficient time, however, to destroy almost all the pups in the kennels.

The mode of invasion in parasitic disease of the bronchial tubes has been, and still is, a matter of much dispute, some observers maintaining that "the ova and young parasites taken up with the food, in the first place gain access from the alimentary canal to the circulation;" others hold the view that they pass directly from the mouth to the trachea, or that the ova are inhaled by the breath. The former view is the one most generally entertained, and it is urged in its favour that the presence of the worms has been determined in the cavities of the heart and in the blood-vessels, as well as in the intestines. Now, in the epidemic under consideration I think this view does not meet the case. Supposing the young embryos to have been ingested and to have gained access to the branches of the portal vein, they would then be carried to the right side of the heart, and from thence to the lungs, by the pulmonary artery, the capillaries of which ramify in the lung substance alone, a situation in which the parasites did not occur. To get to the bronchial mucous membrane they must be returned by the pulmonary veins to the left side of the heart, enter the aorta, and pass out by the small bronchial arteries which supply the tubes—an exceedingly round-about and somewhat improbable route. It is to be remembered that young strongyles have been found capable, like many other nematoid worms, of reviving on the application of moisture after a dessication of a month or more, and even after immersion in spirits of wine, and solutions of corrosive sublimate and alum (Williams), so that their chance of survival under adverse circumstances is unusually good. It seems quite as reasonable to suppose that the dried embryos were inhaled with the breath, and, lighting in the mucous membrane, found suitable conditions for development. The position of the parasites about the bifurcation of the trachea, at the angles of division of the main bronchi, and most abundantly in the lower wall of the tubes, just the localities

where small particles would be most likely to lodge, favours an infection through the air rather than by the blood. The negative evidences in the heart and blood-vessels do not go for much either way, as the examination in all the cases was made after the invasion of the parasites, and consequently at a time when they could scarcely be found in the circulation.

It is a somewhat remarkable fact that verminous bronchitis prevailed to a much greater extent, and is more fatal in young animals than in adults. Thus lambs and calves are the chief victims in epidemics of "hoose," whereas it is only occasionally that adult animals succumb to the disease. In lambs the worms are usually found in the bronchial tubes, while in sheep they are more commonly encysted in the lung tissue itself, where they do not appear to cause much irritation. It seems to me that in the anatomical peculiarities of the lungs in young animals we have an explanation of the fatality of the disease among them. If the bronchial tubes of a young animal be compared with those of an adult they are seen to be softer, much less rigid; the mucous membrane is lower, not so thin, nor so closely attached to the tissues beneath. Hence it happens that in inflammation of the tubes from any cause, swelling and tumefaction of the mucous membrane readily occur, and constitute elements of danger which are directly proportionate to the calibre of the tubes attacked. In the cases above reported the swelling of the membrane in the larger tubes was considerable, and, though not sufficient to prevent the access of air, must have interfered greatly with the expulsion of mucus from the smaller tubes, not only by decreasing and narrowing the orifices of exit, but also by destroying, over an important area, the ciliary action so useful for this purpose. The same difference is met with in human practice. Ordinary acute bronchitis in the adult is not at all a dangerous affection, while in young children it is the reverse; and for the very reason that in them the bronchial mucous membrane swells easily, and there is not the same expulsive power to enable them to get rid of the mucus which, in consequence, accumulates, and may cause collapse or inflammation of the lung tissue. In the "lamb disease" death occurs from asphyxia, caused by the collection of mucus in the tubes. I have no records at hand of the state of the lung tissue in these cases, whether it is in a condition of collapse or of inflammation; probably the latter, for I see the expression, verminous pneumonia," used by some authors.

With reference to the pneumonic condition of the lungs of the dogs in this epidemic, it will be remembered that in three of

the *post-mortem* examinations the inflammation of the lungs was found without the occurrence of parasites in the bronchial tubes; the pneumonia being quite as extensive as in the cases accompanied with strongyles. I must confess that this circumstance has puzzled me not a little, and I see no very satisfactory explanation of the fact. It appears natural to refer the diseased condition of the lung substance in the parasite cases to the accumulation of the mucus in the smaller tubes producing collapse of the air cells in certain areas, which subsequently became inflamed—a sequence of events sometimes observed in children. The appearance of the lungs in several of the cases corresponds with this view; for the pneumonia was lobular, affecting small and isolated portions of the lung tissue.



CASE OF
ANEURISM OF THE HEPATIC ARTERY

WITH
MULTIPLE ABSCESSSES OF THE LIVER.

BY
GEORGE ROSS, A.M., M.D.,
PROFESSOR OF CLINICAL MEDICINE, MCGILL UNIVERSITY, ATTENDING PHYSICIAN
TO THE MONTREAL GENERAL HOSPITAL.

AND
WILLIAM OSLER, M.D., L.R.C.P., LOND.
PROFESSOR OF INSTITUTES OF MEDICINE, MCGILL UNIVERSITY.

(Read before the Medico-Chirurgical Society of Montreal.)

(Reprinted from CANADA MEDICAL AND SURGICAL JOURNAL, July, 1877.)

Montreal :
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(Reprint)

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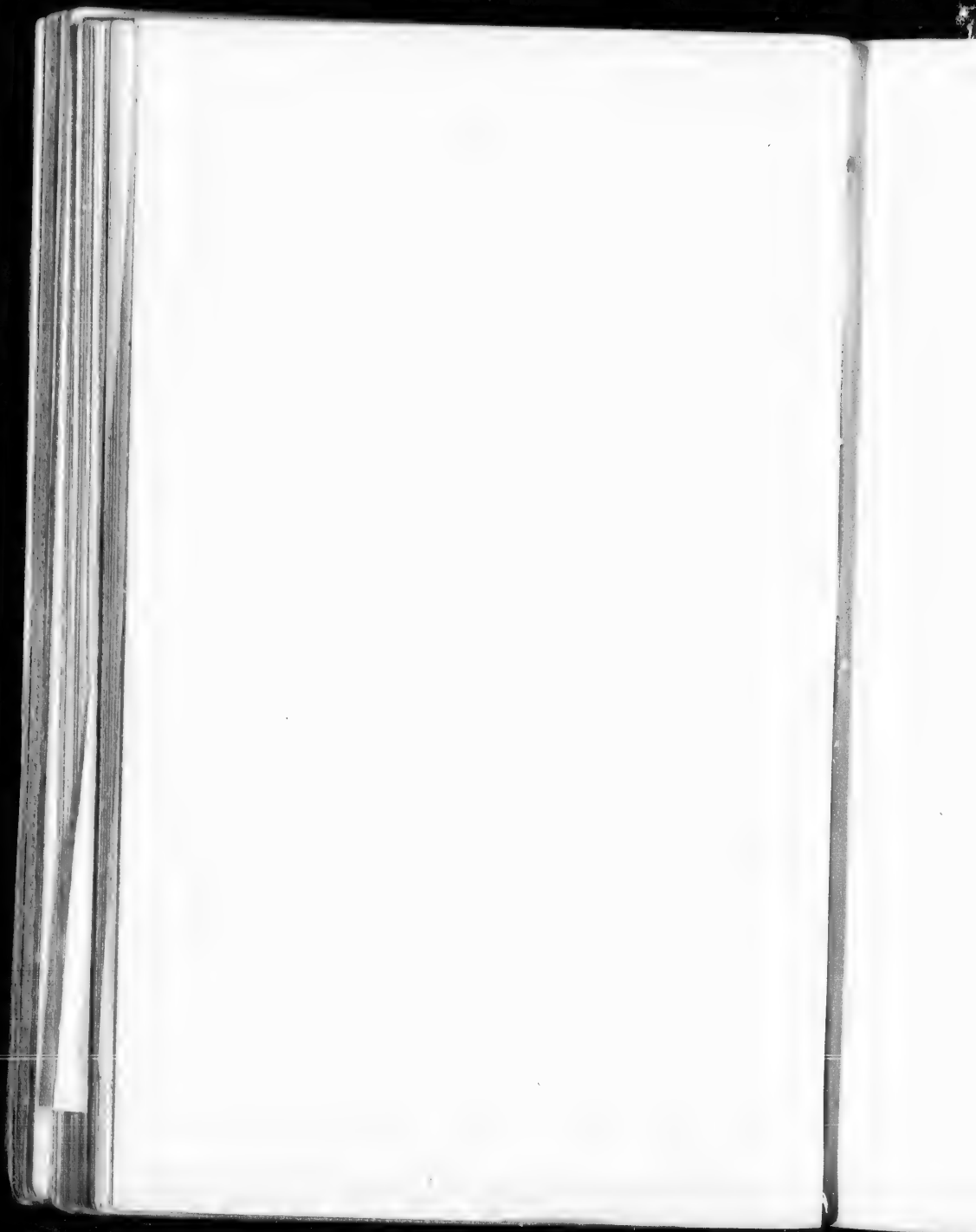
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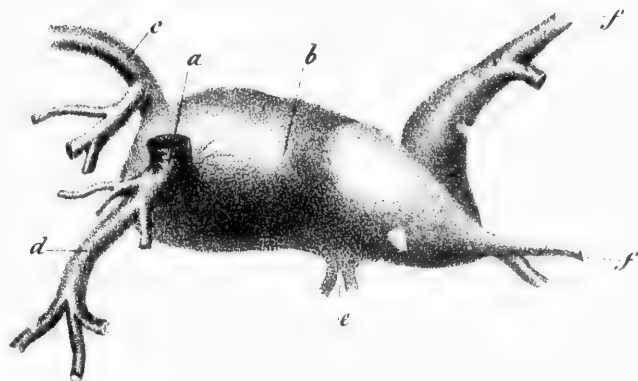
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ANEURISM OF THE HEPATIC ARTERY.

(a) Hepatic artery, (b) right branch mainly involved, (c) left branch, (d) gastro-duodenalis, (e) cystic arteries, (f) occluded branches of right trunk.

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ANEURISM OF HEPATIC ARTERY ;

MULTIPLE ABSCESES OF THE LIVER.

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— AND —

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(Read before the Medico-Chirurgical Society of Montreal.)

Aneurism of the hepatic artery being of such very rare occurrence and the case which we are about to relate presenting in addition some remarkable pathological features, we are led to believe that it will be found of considerable interest.

For the notes of the case we are indebted to Mr. JOHN BRODIE, ward clerk.

W. H., æt. 21, single ; height 5 feet 11½ inches ; weight, about 140 lbs.,—was admitted into the Montreal General Hospital on the 8th of November, 1876, complaining of pains in the right side and great weakness.

The patient was born in Wisconsin, U. S., and lived there until about two years ago, since which time he has resided in this city. His family history, as far as could be ascertained, is good. Has never been ill with the exception of small-pox, and a mild pneumonia of the left lung. Has never had dysentery nor

piles, nor any abdominal or rectal trouble of any kind. Has always been of extremely temperate habits.

His present illness began, he says, about the 1st of September last, with what he describes as a severe cramping pain in the stomach, which began in the morning and continued all day. At 4.30 p.m. of that day he had a violent rigor, lasting about twenty minutes. This was followed by high fever and perspiration. Similar chills recurred, he says, with great regularity, every second day for five or six times, and then ceased after he had taken some medicine from the Hospital Dispensary. At this time his appetite became poor, he felt weak and was very low-spirited, and observed that his skin assumed a sallow colour. Ever since he has been gradually getting weaker and losing flesh pretty rapidly, and the sallow tint of the skin has been steadily increasing in intensity. There has also been almost constantly present a dull, aching pain in the right side over the region of the liver. Slighter rigors, followed by fever and some perspiration, have also occurred several times at irregular intervals.

Present Condition.—Much emaciated, somewhat anæmic, but the whole skin of a dirty, dingy, sallow hue, without any jaundice,—the sclerotic clear, and not yellowish. There is a very peculiar, pungent, somewhat feculent and extremely disagreeable odor exhaled from the surface of the body.

There is slight fullness of the right hypochondriac region which is also somewhat tender upon pressure. *Liver.*—Dulness extends from the 4th interspace to one inch below the margin of the ribs. The belly is full and tumid, and tenderness is also found on pressure over the epigastrium. Splenic dulness not increased. Tongue slightly furred, rather dry, and with red edges. Bowels have been, and still are, considerably relaxed, the motions being light-coloured and especially offensive. Urine, sp. gr. 1019, high-coloured, but containing neither bile pigment, albumen nor sugar.

Heart—Situation and sounds normal, pulse 116. *Lungs.* Resonance and breathing normal throughout, except at the base of

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the right lung where there is an area of dulness with enfeebled respiration. Temperature 105° F.

Ordered quinine gr. xx each evening.

Nov. 11th.—Has not complained much of the pain. Disagreeable odour from the body very marked. Bowels are regular, but motions are ochre-coloured and offensive. Tongue clean. A dull red flush on cheeks especially in afternoon. Has occasional slight epistaxis. Temperature has ranged between 102° F. and 103° F.

16th.—Is getting weaker but is quite cheerful, and feels well. Tongue moist and clean. Takes nourishing food very well, and bowels remain regular. Never vomits. Temperature continues equally high, always rising 2° or more in the evening, followed by sweating which is sometimes very profuse. This usually commences at 6 p.m. Urine 43 oz. sp. gr. 1022. No bile pigment, albumen or sugar.

23rd.—The volume of the liver has considerably increased, and, owing to the progressive emaciation, bulging of the lower ribs on the right side has become quite apparent. Dulness extends from the top of the 4th rib to two inches below the margin of the ribs. The lower edge of the liver cannot be felt owing to the fulness of the abdomen and its tender condition. Pain on pressure over liver region and epigastrium increased. His strength is falling fast, and the sallow colour has become deepened. The odour from his body has been so offensive in the ward for some time that the House Surgeon has been obliged to employ spongings with carbolized solutions, and disinfectants round the bed. He lies almost continuously on his back, occasionally turning slightly towards the right side, but any attempt at turning on his left side is accompanied by severe pain and a feeling of a dragging and weight in the region of the liver. The superficial veins on the right side of the chest are very large and prominent. Ordered linseed poultices over the liver.

25th.—Tenderness less. Hepatic dulness increased in area, measuring 8 inches vertically at the line of the nipple. No localized fulness or redness of the skin or fluctuation to be found

anywhere. The enlargement of the organ is very general and uniform. Pulse 128, very small and feeble. Temperature continues high with evening perspirations. Is remarkably cheerful, saying he feels well but weak, although he suffers a good deal of pain. Ordered acid nitro-mur. dil. Tr. calumb., a a 3ss ter die.

29th.—Pain and tenderness low down on the right side, Excessive pain is caused by the slightest change of posture. Lies constantly on the right side. Pulse 130. His diet throughout has been of a most nourishing kind. Milk abundantly, beef-tea, eggs, wine, &c.

Dec. 3rd.—This morning there occurred a temporary collapse, marked by a rapid fall of the thermometer to a remarkably low level, 94.8° F., accompanied by great prostration and a cold sweat. In the evening the temperature rose to 102.4° F., and during the night great pain was felt in the left iliac region, which was tender.

Ordered an opiate, and a small blister to this region.

6th.—Is rapidly sinking. The signs of effusion in the right pleura, hitherto stationary, have in the last few days, rapidly extended, and there is now dulness over the lower two-thirds of that side, with absence of breathing, and an amphoric note beneath the right clavicle.

7th.—Died at 6.00 a.m.

AUTOPSY, 31 HOURS AFTER DEATH.

Rigor mortis present. Skin of a dirty-brown colour. In the abdomen about 22 oz. of yellow turbid fluid. In the right pleural cavity about 20 oz. of similar fluid. *Right lung* collapsed. The pleura covered with a thin layer of greenish-yellow lymph. On section, the lung is dark, airless and sodden. *Left Lung.* On the visceral layer of the pleura, especially behind, are numerous small ecchymoses. On section, organ contains much blood, is firm, and only slightly crepitant. *Heart* normal. *Kidneys* rather pale, cortex swollen, and malpighian tufts injected. *Spleen*, weight 445 grms. (14 oz), adherent to the stomach. Organ soft. On section dark and congested.

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Intestines normal. No trace of ulceration in the large intestine.
Bladder and prostate, normal.

Liver, 4879½ grammes, (10¾ lbs). The peritoneum around it in many places showing signs of inflammation. The left lobe intimately adherent to the stomach by a thick layer of firm yellowish-coloured lymph. The right lobe also cemented to parts in its neighbourhood by lymph of a similar character. A small amount is also observed on the descending colon, but the general peritoneal surface is not affected, the serous covering of the intestines being clear and glistening. The liver itself retains its normal shape, the upper surface is smooth and not adherent. Towards the right border a yellowish-coloured swelling is evident which is perceptibly fluctuating. Other less distinct yellowish spots are seen scattered over the organ. To the touch the upper and back part of the right lobe is exceedingly soft and fluctuating. On the under surface many yellowish-white nodules are apparent, some large, others quite small, all distinctly fluctuating. A similar one of large size is apparent on the under surface of the left lobe. A transverse incision through both lobes reveals the fact that we have to deal with a diffuse suppurative hepatitis. An immense quantity of yellowish-white, custard-like pus flowed out. The right lobe is completely honey-combed by a series of small, closely united abscesses, ranging in size from a marble to a walnut. The septa between these abscesses are composed of a dark-red tissue. Most of these small abscesses communicate together; some have merged to form larger ones. They all possess distinct lining membranes which are frequently stained with bile. The left lobe is in a similar condition, and in both the abscesses extend throughout the thickness of the organ. Thus, the only portions of liver-substance which are found comparatively free are the lobus quadratus and that portion of the organ lying immediately above and a little to the left of the gall bladder. These parts on section are of a dark colour, lobules distinct, small bile vessels very evident. The gall bladder is small, contains about three drachms of a clear, somewhat viscid secretion. On pressing it and along its ducts no fluid could be forced out at the papilla biliaria. It was with

much difficulty that a probe could be passed along the cystic duct, owing to an unusual number of irregular folds of its mucous membrane which were evident when the duct was slit up. The common bile duct itself was patent, the mucous membrane of its upper two-thirds stained with bile. There were no clots in the superior mesenteric, gastric, or splenic veins. On slitting up the portal vein itself, a small abscess was found to project into the calibre of one of its right divisions. The tissue in the neighborhood of these main divisions was infiltrated with pus. A firm nodule was felt at the portal fissure and mistaken at first for a bunch of lymph glands. Section of this, however, showed it to be distinctly laminated, and careful dissection of the part revealed the existence of an *aneurism* just at the bifurcation of the Hepatic Artery, but occupying chiefly the right branch. (see plate.) The dilatation begins immediately beyond the gastro-duodenalis, (*d*) and extends for about 3 inches as a somewhat conical swelling. The left hepatic artery (*e*) arises from the obtuse end of the aneurism and is unaffected. At its thickest part its circumference measures 3 inches. For $2\frac{1}{2}$ inches it passes to the right and gives off two branches (*f*) which appear occluded, then turns at right angles and passes backward for $1\frac{1}{4}$ in., towards the posterior border of the liver, terminating by a conical extremity which is continuous with the main branch of the artery. The arteries of the body had been injected, and the red mass is found in the trunk of the hepatic before its bifurcation, in the gastro-duodenalis, and the left hepatic branches, all of which are full and tense. The hepatic artery appears to enter the aneurism about $\frac{1}{4}$ of an inch from the obtuse end, the gastro-duodenalis and left hepatic being given off apparently from the dilatation itself; and on slitting up the hepatic artery it appears at first sight as if these were its only branches, and that its communication with the aneurismal sac had become obliterated. Careful inspection, however, of the lower and posterior wall reveals a small canal, the calibre of a hypodermic needle, which leads directly into the sac. The aneurism being opened by a longitudinal cut on the upper surface, it is seen that the anterior third, comprising the rounded end, is completely filled with firm

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decolourized laminæ of fibrin, concentrically arranged. The middle third of the sac contains semi-coagulated blood, and red injection mass, after emptying which there is seen a cavity about the size of a small walnut. This is in communication with the hepatic artery by the small canal already referred to, which passes for rather more than half an inch through the fibrinous laminæ of the anterior end. Two small branches, both containing injection pass from the cavity, one the cystic, (*e*) going to the gall-bladder, the other a somewhat larger branch, passing to the central part of the organ. The sac is lined with sheets of fibrin, which, at the under part were thinner than elsewhere, and at this point the blood has infiltrated the proper coats of the aneurism, which, in consequence, look reddish black. The terminal portion of the sac lay chiefly in the substance of the right lobe, surrounded by suppurating hepatic tissue, which had to be dissected away to expose it; and on section the cavity is found almost completely obliterated by fibrinous laminæ, which in the centre are softer, and not so colourless as the other end of the sac. No direct passage could be traced through this from the central cavity, and the main branches given off from the aneurism are found empty, and at their commencement plugged with fibrin, which in several extends as a thin sheet along the intima.

The condition appears to be one of simple aneurismal dilatation of the vessel. the walls being thin, slightly roughened on the interior, but not markedly atheromatous. The trunk of the hepatic artery itself looks healthy, and there are no evidences of general vascular degeneration.

Remarks.—Aneurismal dilatation of the Hepatic Artery would appear to be of rare occurrence, the chief reason, of course, being that its main cause—atheromatous degeneration—is very seldom met with in this situation. Embolism of this artery Frerichs has never seen—the situation and mode of giving off of the vessel being such as to hinder the entrance therein of foreign substances from the stream of the aorta. One single case of the kind has been recorded by Virchow, where an hepatic abscess followed embolism from a gangrened lung.

The same author (Frerichs) alludes to four, or possibly five,

as the only recorded cases of Aneurism of the Hepatic Artery. They are those of Ledieu, Stokes, Sestier, Wallmann and Lebert. In the case of Ledieu, the patient died of some pulmonary complaint, and had never had any symptoms of hepatic disease. There was found, just before the giving off of the pyloric branch, on the hepatic artery, a small hard tumour the size of a hazel nut. It was entirely composed of firm laminated fibrin, and had completely occluded the main artery. The case of Sestier was also obscure. There had been "symptoms of some chronic painful affection of the stomach." The right branch of the vessel was found occluded by a small aneurism filled with clots, and the gall-bladder was gangrenous.

In Wallmann's patient—a female—there was an account of attacks of violent pain in the upper part of the abdomen, coming on after intervals of several days, gradual loss of strength, and emaciation. There was enlargement of both liver and spleen. No ascites; no fever. Then there supervened obstruction of the ducts with perceptible fulness of the gall-bladder, and very deep jaundice. She was believed to be suffering from gall-stones. Then fever, abdominal tenderness, collapse and death. A large aneurismal tumour was found in the situation of the lesser omentum. It was the size of a child's head, and showed a rent communicating with the cavity of the abdomen.

Lebert's case was accompanied by severe pains in the pit of the stomach, followed after a time by hæmatemesis and mælena. Vomiting was persistent, and the patient soon died. The aneurism involved the main trunk of the vessel, and communicated by a fistulous opening with the gall-bladder, by which means the blood had found its way into the duodenum and stomach.

From a relation of these cases Frerichs sums up as follows the clinical features resulting from this lesion:

"The symptoms to which aneurism of the hepatic artery gives rise are accordingly of a three-fold nature. In the first place there is the tumour, which is sometimes remarkably large and displaces the liver; secondly, there is the neuralgic pain, produced by pressure upon the hepatic plexus of nerves; and lastly there is jaundice caused by compression of the bile ducts. The

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fatal termination in most cases takes place under symptoms of internal hæmorrhage."

We are inclined, therefore, to look at the record of the present case as of considerable importance, inasmuch as it clearly shows that besides, or even without, any of the symptoms mentioned by writers as accompanying aneurism of the hepatic artery, it may actually institute an entirely different series,—those namely of acute suppurative hepatitis of a diffuse character. The case as it came under observation was one presenting the marked characteristics of the latter disease, and every possible source of contamination of the portal system which might have given rise to it was interrogated in vain. Of course, we need hardly say that the real cause was entirely unsuspected, nor do we see but that the diagnosis of the aneurism was truly impossible. In the future, however, we must admit, in cases owning no other evident cause, that hepatic aneurism may be the starting point of acute hepatic abscess.

Among the many interesting points in connection with this case, the causation of the multiple abscesses takes the front rank; not only because in this one alone among the recorded cases was the fatal termination due to a suppurative hepatitis, but also on account of the extreme rarity in the human subject of opportunities of studying upon this organ the effects of disease of the hepatic artery. Taking for granted, as from the careful examination we may justly do, that the portal system did not in this instance furnish the *materies morbi*, we have to consider the consequence of total obliteration of the hepatic artery, or of its main branches, and also the effect of small emboli, in the form of particles of fibrin, plugging its terminal twigs.

It will be necessary first to refer briefly to a few anatomical and pathological points in connection with the blood supply of the liver. This, as in the lungs, is two-fold; the portal vein ministering solely to the functions of the gland, the hepatic artery chiefly to its nutrition. The ultimate branches of the portal vein ramify at the periphery of the lobules, forming the interlobular vessels, from which numerous capillaries pass into the interior, and finally converge to the centres of the lobules, as

the ultimate radicals of the hepatic veins. The hepatic artery furnishes blood to the bile ducts, portal and hepatic veins, and the connective tissue of Glisson's sheath. Its capillaries empty their blood by small venules into the interlobular veins. Hence, remembering this distribution of the hepatic artery, it is easy to understand how that in cases of thrombosis of the portal vein, even where the obstruction is complete, the functions of the organ may be maintained, and both bile and glycogen secreted; for the capillary plexus of the lobules continues to receive through the interlobular veins the blood which has been emptied into the latter from the venules of the hepatic artery. The nutritive blood serves as a substitute, acts vicariously, for the functional. It has been maintained, and the statement passes current in the text-books, that the converse of this is true, viz: that the portal blood can replace the hepatic, the functional act for the nutritive. This view is based on experiments made upon the lower animals. Schiff states that in the cat the functions of the liver are performed just as well after ligature of the hepatic artery as before; and Betz found that in the dog, after tying the trunk of the hepatic and all the collateral branches, no important alteration took place either in the structure of the liver or in its secretion.

Cohnheim and Litten have shown, however, in a very important paper on "Disturbances in the Circulation of the Liver," (Virchow's Archiv. May, 1876), that in experiments on dogs arterial blood still reaches the liver even after ligation of the hepatic, the coronaria ventriculi, and the gastro-duodenalis, owing to the very extensive anastomoses and connections of these vessels. In the guinea pig, on the other hand, the supply of arterial blood can be completely shut off, either from the whole organ or from individual lobes. In the former case the operation is always fatal within 24 hours, and even in this time important changes are found to have taken place in the organ. These are all the more marked if, instead of ligating all the arteries, only the one going to the extreme right lobe be tied. The result is an entire necrosis of the portion of the liver supplied by the ligatured artery, and in every instance the animal died within two days.

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Cohnheim states that pathological proof of the correctness of this view is as yet wanting, but we are inclined to believe that by this case the deficiency is supplied; for we think the supuration of the organ best explained on the view, that the shutting off the supply of blood, either by the gradual occlusion of the aneurism by clots, or by the quicker process of emboli conveyed away from the interior of the sac, produced numerous areas of necrosis, which subsequently became, by inflammation and a sequestering suppuration, converted into abscesses. It is impossible to determine, in the absence of any positive evidence, whether the process resulted from emboli or simply by the gradual obliteration of an important blood channel; and in any case there are certain difficulties which will occur to the minds of many in the view which we have suggested. There are at least two cases on record of total obliteration of the artery, without consecutive suppuration, one of which was from aneurism. Still, this, if occurring gradually, and not involving the pyloric artery, need not necessarily, as the above-mentioned experiments prove, deprive the liver of arterial blood. There is no reason to suppose that the obliteration in the case before us did not occur slowly, for the fibrinous laminæ, especially at the anterior end, were firm and tough. Again, on an embolic theory it might be urged that in this instance the emboli, consisting of fibrinous shreds from an aneurismal sac, should have produced simply mechanical effects, infarctions, and not, as in the case of emboli proceeding from necrotic or suppurating foci, abscesses. Mechanical emboli do, however, sometimes produce suppuration, and in the liver might do so by causing death of the structures supplied by the obstructed arteries, viz: the portal vessels, bile ducts and connective tissue of Glisson. In the present case, supposing the process to depend on emboli, there would be arterial blood enough sent through collateral branches to furnish material for an active suppuration about the necrotic centres. Altogether, we think the embolic theory meets the case better than any other. We must remember, too, that the disease was not rapidly fatal, but came on slowly, lasted five weeks or more, and it is not unlikely that during time that much of

the fibrin was deposited, and the obliteration of the distal end of the aneurism took place. This is rendered still more probable by a consideration of the condition of the left hepatic branch, the commencement of which is involved in the aneurism, but which now, owing to the filling of the proximal end of the sac with fibrin, appears to be almost the direct continuation of the main trunk. In fact, for a short distance from the bifurcation, the upper wall of the left branch is made up of condensed fibrin, which is grooved by the blood chanel. This explains, too, the occurrence of the abscesses in the territories supplied by the left branch. The almost entire obliteration of the obtuse end of the sac occurred, most probably after the mischief had been started by the escape of emboli. The appearance of the abscesses adds further support to this view. None of them looked recent or contained shreds of necrotic liver tissue, but all were filled with a creamy pus, and had walls lined by definite pyogenic membranes.

We have no clue to the origin of the aneurism itself. The age of the patient, and the absence of arterial degeneration elsewhere, are almost sufficient to exclude atheromatous degeneration as a cause, and the walls of the sac appear thinned but not evidently diseased. Of other agencies capable of producing aneurism, especially of smaller vessels, embolism is the most important, and, even in the absence of valvular disease, and remembering the unfavorable position of the hepatic artery for emboli, we are inclined to regard it as the most probable cause.

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ON THE OPENING OF THE FORTY-FIFTH SESSION

OF THE

MEDICAL FACULTY MCGILL UNIVERSITY

OCTOBER 1st, 1877.

BY

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INTRODUCTORY LECTURE.

GENTLEMEN OF THE FACULTY,—The duty of delivering the introductory lecture has this year fallen to my lot, and however opinions may differ as to the necessity or advisability of beginning the session with such an address, there can be no doubt of this—that it affords an opportunity, rarely given, of offering to the assembled students words of welcome, advice, and encouragement—an opportunity, the responsibilities of which come home to one with the thought of these young and eager lives just entering upon the serious work of life, and to be influenced for weal or woe, perhaps by what the Introductory Lecturer may say, and most certainly by what we as a Faculty do.

STUDENTS OF MEDICINE,—My first duty, then, is to bid you on behalf of the Medical Faculty a hearty welcome ; and I do so most sincerely, feeling sure that I express the sentiments of every one of your teachers when I say that you come now into the society, not of mere Professors who will lecture at you from a distance, but of men who are anxious for your welfare, who will sympathize with your difficulties, and also bear with you in your weaknesses. I can offer no better welcome than to tell you this. I see among you many with whose faces we are all familiar, who return, and not for the first time, to these benches. To such, words of welcome are superfluous ; I will only say we rejoice to see you back, we trust with refreshed bodies and invigorated minds, to pursue the work of the session. To those of you who for the first time occupy seats in this class-room the

occasion is a memorable one, to which I trust you will look back in after years with exceeding pleasure as the starting point of a career of usefulness and honour. For you we have a special sympathy. Look upon us as elder brothers to whom you can come confidently and fearlessly for advice in any trouble or difficulty.

On such an occasion as the present it is natural that you should expect to hear from me something about the profession of your choice, its position, the prospects it holds out to you, and the relation that you as students bear to it. Probably there are few among you who could give a very logical explanation of the causes which induced you to adopt this in preference to other callings; with one it has been the influence of a friend; with another, perhaps, hereditary predisposition; with a third a sudden inspiration; with another that innate enthusiasm for the science which is akin to the natural gift that makes of one man an artist, of another a musician, an inborn natural fitness for that special work and no other, which the man's surroundings, whether fostering or adverse, can neither give nor take away. From these last arise our greatest men; for others it matters little in what way the impulse has come, so long as the feeling now thoroughly possesses you, penetrating every fibre of your being, that this above all others is the profession you can most heartily embrace. If, however, any man of you here enters upon it with the idea that it will do as well as another, that other will most probably be better for you. Lukewarmness, bad enough at any time, is simply fatal at the beginning of a life-long career, when it usurps the place of that enthusiasm that should bend the man's whole nature to serve him willingly in the work that he has chosen.

In addressing a few words to you on the position which the medical profession at present holds, I must admit that different men hold very opposite views on this point. Some will tell you that the profession is underrated, unhonoured, underpaid, its members social drudges—the very last profession they would recommend a young man to take up. Listen not to these croakers; there are such in every calling, and the secret of their

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discontent is not hard to discover. The evils which they deprecate, and ascribe—it is difficult to say to whom—in themselves do lie,—evils, the seeds of which were sown when they were as you are now ; sown in hours of idleness, in inattention to studies, in consequent failure to grasp those principles of their science without which the practice of medicine does indeed become a drudgery, for it degenerates into a business. I would rather tell you of a profession honoured above all others ; one which, while calling forth the highest powers of the mind, brings you into such warm personal contact with your fellow-men that the heart and sympathies of the coldest nature must needs be enlarged thereby. For consider the practical outcome of all the knowledge you gather ; the active work for which your four years' study is a preparation. Will not your whole energies be spent in befriending the sick and suffering ? in helping those who cannot help themselves ? in rescuing valuable lives from the clutch of grim disease ? in cheering the loving nurses of the sick, who often hang upon your words with a most touching trust ? Ay ! and in lessening the sad sum of human misery and pain by spreading, as far as in you lies, the knowledge and appreciation of those grand laws of health transgressed so ignorantly and yet avenged so fatally ?

It cannot be denied that, (excepting the clerical profession, the members of which, in this country at least, can seldom look for the fruit and reward of their labours on this side Heaven), there are fewer great prizes open to the medical man than to others from whom a long and special training is demanded. He is not raised to command his fellow-men ; his name is not immortalized in history and song like those of the gallant veterans who wear her Majesty's uniform, and risk their lives for their country and their Queen ; he does not sit among the judges of the land ; the high places of brilliant statesmanship are not for him ; while the world at large can reward him with little beyond a successful practice in which every dollar that he earns represents its equivalent in hard continuous work. But while the soldier and the statesman win honour and fame, the family physician will draw to himself the love and gratitude of manifold

hearts ; he will have no enemies, martial or political ; and his labours if directed by a wise and prudent skill, will be for the welfare and benefit of all. Such honours as are open to him lie chiefly within his own profession and the small circle of the scientific world. Among these his name may be as a household word, his opinions may be quoted as conclusive, his writings become standard works ; and these honours are very real and very satisfactory. I need only quote such names as Harvey and Hunter, Jenner and Virchow, to show you what I mean. But let the student remember that while influence or party may advance a man in other professions above many superior to himself, the hero in medical research must wholly depend upon his own deservings. To take a foremost place in the wary and critical field of science he must excel.

And these remarks naturally bring me to a consideration of the state of the profession in this country. Though not so advanced in the scientific departments as in the older countries of Europe, yet I think the condition is one for congratulation, for in practical work and in the average of attainments the members of the profession in Canada yield to those of no other country ; and this is what should be desired, for general professional excellence brings about the greatest good to the greatest number. For this we have largely to thank that wise conservative spirit which directed the founders of our medical institutions, and which has ever since remained with the promoters of medical legislation in this country. While across the border the standard of qualifications has been gradually retrograding, and not until now, upon the chaos which resulted from the Free Trade principle applied to medicine, is the light breaking and with it glimpses of a future full of hope, the people in Canada have enjoyed the benefit of a uniform medical curriculum, modelled after that adopted in Great Britain, to which all students have had to conform—a benefit which many of our citizens fail to appreciate, having had no practical acquaintance with the opposite condition. Early in the history of this country, before the establishment of universities, the medical men found it necessary for their own protection to organize, and to obtain

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powers from Government to inspect and verify the degrees and diplomas of persons wishing to practice, and also after a suitable course of study to examine men for their license. With the establishment of medical schools these organizations became, to a large extent, mere registering corporations, though still possessing the power to examine, and to grant licenses. Latterly, however, owing to the increase in the number of medical schools, and the consequent latent distrust in the profession that undue rivalry between these might, as in the United States, lower the standard of attainments, there has been legislation to take in part or altogether from the universities their power of granting the license to practice together with the degree. In the Provinces of Quebec and Ontario the changes are in different stages of development. In the former the first step only has been taken, and while the preliminary examination has been removed from the hands of the universities the power to practice still accompanies the degree on its registration. The recent Act of the College of Physicians and Surgeons of the Province of Quebec, while modifying the Constitution of that body to some extent, influences medical education in two ways: 1st, by requiring all students belonging to this Province to pass the matriculation examination of the College, and to spend four subsequent years in the study of medicine, the first session to be attended immediately after the matriculation examination, the standard of which has also been somewhat advanced, French and Literature being now compulsory subjects; 2nd, in nominating visitors to see that the colleges do their work faithfully, and that the examinations are conducted properly. This latter is, in my opinion, a weak point in the recent legislation, but as it is probably only temporary there is less cause for regret. Passing on to consider the more developed system in connection with the profession in Ontario, incorporated as the College of Physicians and Surgeons of that province, we find there that colleges and schools of medicine are merely teaching bodies, the power to grant license to practice being vested solely in the Council of the College, and obtainable only by examination. So also the preliminary

examination of that body is compulsory upon all medical students of that Province. Opinions differ very much regarding the Ontario Medical Council, and it is not to be denied that as a body the members have laid themselves open to criticism, but no one can question that its existence is fraught with much good to the profession, and that it has influenced medical education very beneficially and may do so yet more. In the establishment of annual examinations, they have, I think, conferred a boon upon the students, which the students, I am sorry to say, have been slow to recognize. I would urge upon the Ontario men among you to conform in all particulars to the laws of your Province, for you may rest assured of this, that you will have no sympathy from us in any attempts to evade them. Thus the men among you who neglected to present yourselves for the first annual examination last spring, felt aggrieved when the Council determined that your obstinacy should cost you a year. I had letters from several of you expecting sympathy, but you came to the wrong quarter. Breakers of the law must abide by the consequences: though I believe in this instance, as it was the first offence, the Council will permit you to take both the 1st and 2nd year's examination next spring.

In the other Provinces of the Dominion the old system is still in force, and the profession has not such control over its educational matters as in Quebec and Ontario. It seems a pity that a central examining board could not be established for the whole Dominion, but there are serious difficulties in the way, difficulties which I do not think will in this generation be overcome. The best we can hope for will be central examining boards for each Province, a uniform curriculum, a uniformly high standard of examination, and general reciprocity.

Turning from these matters of medical politics, I now try to answer the question which has, I am sure, come to each one of you more than once in the past few days, "How shall I best occupy my time?" To answer this I take to be one of the chief uses of such a lecture as the present. To those of you who now begin the study of medicine this is an all-important

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period, for what you do this session will probably be an index of what you are capable of doing, and will certainly have a great influence upon your college career. Five subjects will mainly occupy your attention: anatomy, physiology, chemistry, materia medica and botany. The three first constitute the frame-work of medical science, a portion of which must this session be put together,—and allow me to indicate how much. In anatomy you should confine your attention to mastering the bones, ligaments, and muscles, their general arrangement, individual peculiarities, and mutual relations. Do not attempt to do more, but try to accomplish this. Three extremities, at least, should be dissected, which, with the lectures, ought to give ample opportunities for mastering your work in this branch. In physiology you must learn the constituents or components of bones, muscles, and the other textures of the body; the nature and properties of food, and how it is digested; about the blood, the manner of its circulation, and the method of its purification. In chemistry you must master the principles of heat, light, and electricity, and the non-metallic elements. In materia medica, strive to see and know all the drugs you can, find out what they are made of, and get a notion of the dose of each. Ignorant as you are of disease, a knowledge of their application will be more suitable later on. Botany will be useful to you chiefly as an introduction to materia medica; it is thought necessary that you should be fully acquainted with the structure and organization of plants the better to appreciate the medicinal virtues of certain of them. Do not, however, regard it, as I have found in the past three years many men do, as the essential subject to be studied in your first session, to the neglect of more strictly professional work. Those who like can take up the structure of animals, zoology and comparative anatomy, instead of botany; and I have been surprised that so few men do so, for the grasp of principles obtained in a careful study of the form and nature of animals, and the bearing of this upon human anatomy and physiology, is more valuable, in my opinion, than the benefit derived in the study of materia medica from a previous course of botany.

One thing, however, do not attempt—to take both ; you have not time for that.

Shall you attend lectures in any of the final branches during your first year ? Most emphatically, No ! It would be as reasonable to ask men to listen to lectures in German when they did not know the language. Some of you, however, having studied a year with a physician, purpose spending but three years in college work, and then you must needs take one or two of the final branches in your first session. If you have been diligent in the preparatory year you may appreciate them, but otherwise it will be so much time wasted.

The question whether the first year student should see hospital practice is different, and one upon which there is less agreement ; some believing that he should defer this until the second session, others that he should begin at once. I hold with the latter. An hour spent daily in the out-door department of the hospital in attentively watching the examples of disease brought in will do much, especially if combined with a little instruction, towards educating powers of observation in a student, and giving him a general idea of the names and appearances of many maladies ; while every one of you can learn within the next six months to detect fluctuation in an abscess, and how to open it ; to recognize crepitation in a fracture ; and to master many other little practical details, which you cannot know too soon. My advice to you then on this point is, attend the out-door department of the hospital when you can ; the time, from 11 to 12.30, is very convenient, except when you have dissecting to do in the morning.

From these remarks you will see that a full programme is prepared for you, and it is for each one of you to set about the task with energy and determination. Gradually those difficulties will vanish which at first appeared insuperable. I remember well, when beginning the study of medicine—it is but ten years ago—with what enthusiasm I took my Gray's Anatomy and attempted to master the structure of one of the cervical vertebrae, and though I succeeded in making a little headway, yet the matter seemed so difficult—the bones were

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indeed very dry—and, turning over the leaves of that ponderous volume, the subject of anatomy appeared so vast, that my heart sank within me and I felt despondent. You will also have moments when the way appears rugged and the out-look dark, but never fear; others have succeeded in the face of the same difficulties, and with patience and perseverance you will do so too. Banish the future; live only for the hour and its allotted work. Think not of the amount to be accomplished, the difficulties to be overcome, or the end to be attained, but set earnestly at the little task at your elbow, letting that be sufficient for the day; for surely our plain duty is "Not to see what lies dimly at a distance, but to *do* what lies clearly at hand." (*Carlyle*)

To the second, third, and fourth year men among you, I need not enter into the details of the work required in your respective classes. I will only mention here that both *materia medica* and chemistry may now be passed at the end of the second session, and I would earnestly advise the second year men to take advantage of this. Those who feel competent can present themselves for the practical anatomy examination, so that in this year you will only have chemistry, *materia medica*, clinics, and, perhaps, one final lecture to take, which will be quite enough if attended to properly. Second year men, as a rule, take too many lectures; this is a great mistake. Four lectures a day are as many as the student can well digest.

And now let me add a word of advice on the method of studying. The secret of successful working lies in the systematic arrangement of what you have to do, and in the methodical performance of it. With all of you this is possible, for few disturbing elements exist in the student's life to interrupt the allotted duty which each hour of the day should possess. Make out, each one for himself, a time-table, with the hours of lecture, study, and recreation, and follow closely and conscientiously the programme there indicated. I know of no better way to accomplish a large amount of work, and it saves the mental worry and anxiety which will surely haunt you if your tasks are done in

an irregular and desultory way. With too many, unfortunately, working habits are not cultivated until the constraining dread of an approaching examination is felt, when the hopeless attempt is made to cram the work of two years into a six months' session, with results only too evident to your examiners.

The science and art of medicine is progressive; therefore colleges and teaching bodies, representing as they do the embodiment of it, must progress with it and that on several lines. Not only must the results of practical and scientific labour in the different departments be incorporated in the lectures, so that in every subject the teaching may keep pace with the times, but new and better methods of instruction and examination must be adopted, and many other improvements made which shall be for the benefit of the student. At this more than at any other time within the past fifty years the leading minds in the profession are occupied with the subject of medical education, and there is an almost universal feeling that in many quarters reform is needed. It is probable that the next decade will see radical changes in the modes of tuition, while practical work will be introduced more and more largely into every department. With all beneficial reform the Medical Faculty of McGill University will sympathize, asking her students to participate therein, believing not in stereotyped forms but in steady onward progress, convinced that—

"On our heels a fresh perfection treads,
 born of us,
 Fated to excel us."

To some recent changes I would briefly call your attention; and first to the practical examinations in anatomy. Though it has always been customary for the Demonstrator to test the knowledge of the student on the subject, and while the oral part of the primary examination was made more or less practical, yet it was felt that something more might reasonably be expected of you. Therefore, examinations in practical anatomy have been established, modelled after those of the Royal College of Surgeons, England. Nothing will give you greater confidence when you enter upon practice than an intimate acquaintance

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with anatomy, and that you can obtain to perfection in our dissecting room. The advantages in this branch are very great; remember that we shall look for proportionate effort on your part. Practical examinations will also be held by the clinical professors in medical and surgical anatomy.

Attendance upon the lectures in hygiene is now compulsory. From 1871, when the course was established, the Faculty felt that, notwithstanding the importance of this subject, they could not reasonably add it to the already numerous compulsory studies. This, however, has now been done, and being a department of medical science so necessary to the well-being of society, dealing as it does so largely with the prevention of disease, there is no cause for regret in this action on the part of the Faculty, save that it binds an additional burden on backs already well laden.—still it is one which if rightly treated will not be hard to carry.

The abolition of Theses is a change which, I am sure, you will all appreciate. They were relics of the past, and though formerly they might have been an important means of ascertaining a man's capacity and judging of his fitness for a degree, this is now done in other and more effective ways, and the Thesis had degenerated, as a rule, into a very inferior medical essay quite devoid of originality. At universities where the degree of Bachelor of Medicine precedes the Doctorate, the writing of such an essay for the latter appears reasonable, but where, as at McGill, the M. D. is granted at once, it is superfluous. One regret goes with it. "Defence of Theses" is no more—a day regarded by candidates with very mixed feelings; an uneasy nervousness about one's own effort, and the criticisms it would call forth; and a natural curiosity to hear the comments upon the productions of brother students. The day, as a rule, was productive of little good, for the Theses were rarely defended and the best that can be said about it is that it was sometimes a pleasant gathering. Many a joke has been made, and much laughter excited over the mistakes of unfortunate competitors, but occasionally a sensitive spirit has been unintentionally bruised, and has left us with feelings of bitterness which would

long mar that pleasant and affectionate remembrance of his university life which we would fain have each one of you carry with him to the end of his days.

At the hospital the attendance is increased to eighteen months, while very important changes have been made in the clinical department whereby the method of teaching has been more systematized. Instead of having clinical Medicine daily for the first three months of the session and clinical surgery in the last arrangements have been completed under which the two classes will be carried on simultaneously throughout the six months' course, the class taking clinical medicine and clinical surgery on alternate days, having in each subject one lecture weekly in the theatre and three demonstrations at the bed-side. You will find this plan greatly conducive to your advancement, and I look upon it as a strengthening of what has always been a strong point in this school, a point upon which the reputation of any school must mainly depend, viz: the effectiveness of its clinical teaching.

And further, it is no longer taken for granted that you will compound medicines during the summer months either at the hospital or with your preceptors, but you are compelled by law to spend at least six months in so doing, and to present a certificate for the same before qualifying for your degree at the university.

And lastly, the amount of material at our command will enable us to extend the pathological teaching of the school. The system we have followed heretofore was good but incomplete. It is impossible properly to instruct students how to perform post-mortems and at the same time to demonstrate fully to them the lesions met with. I purpose this winter establishing a weekly demonstrative class, in imitation, however feebly, of the course conducted by Virchow in Berlin, in which the material collected may be made thoroughly instructive to the final men among you. Pathology is the ground-work of clinical medicine, and if you wish to obtain a true insight into disease never neglect an opportunity to see and handle its effects on the various organs and tissues of the body.

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I trust the Medical Society, established during the past summer session, will receive your hearty support. To those of you who take advantage of it the benefit will be inestimable. It affords opportunities which after graduating you can never have of learning how to prepare papers and to express your ideas correctly, while it is also a training in the difficult science of debate.

To a man who has made his start in life, who having chosen his path is now following it day by day, there is something heart-stirring in the sight of a number of young men, such as those who are gathered here, just entering on the race which they will run with such varied powers, with such different results, in the busy arena of the world. For he knows that on such an occasion their hearts must be seething with thoughts of the future and of all that it may be to them. What high hopes swell the breasts before him! What earnest resolves are hidden behind the brave young faces! What steadfast aims are set as the goal which shall reward the worker for each "passionate bright endeavour" that he makes! Surely such thoughts are to each man among you as a trumpet-call, summoning the young recruit to fall into his rank on the battlefield of life. And further, like some soft, familiar melody running through the clangour of martial music, the thought of home must needs mingle with all others, till the student's fondest hope is the hope that he may be the pride of those who have cherished him from his childhood; his firmest resolve the resolve to do nothing unworthy of their trust in him; his holiest ambition to satisfy their loving desires for his welfare and advancement.

To the younger ones in such an assemblage as this, who are but just entering on college life the new sense of liberty must be paramount. No longer subject to the narrow rules of school-boy days and to the penalties that enforce them; released from the gentler, but no less real, restraints of home; bound only by the laws of his Alma Mater, which demand little from him that he would not willingly give, the youth feels himself for the first time his own master, and the sense of freedom rouses the growing

manhood within him and gives impulse to that self-reliance and independence of action that in after years brace the man for the deeper responsibilities of life, when the power to choose is no longer a delightful novelty, but an anxious care.

So much for the inspiring feelings which animate the student at the beginning of a fresh course ; but I am sure many can bear me out in saying that these are not all. The fear of failure underlies every effort, and this fear must be specially present to those who run the competitive race of a university career, in which a man naturally desires, not only to reach the standard which shall secure him his degree, but also to take a high place among his fellows. This fear of failure abides with some, paralyzing their energies and growing more burdensome as time wears on and their test day is near. But let the student take courage ; for though in the nature of things only one man can carry off the highest honours, I doubt if there be one among you who cannot come out well at the end of the session if he will only work as he ought. Remember, moreover, that :

"E'en when the wish'd end's deny'd,
Yet while the busy means are ply'd,
They bring their own reward."

Looking round upon you all I feel no doubt that the majority are resolved to make good use of their time, to study in earnest, and to take a creditable stand in those examinations which in a few months will test the work of every one of you. How comes it then that so many fall away from such good intentions ? Why is it that some barely pass who should come out with flying colours ? Why do others fail altogether ? Not, as a rule, from want of mental capacity ; not from a lack of the bodily stamina necessary for a course of severe study ; but rather from a failure in steadfast perseverance. Men begin well ; they are diligent in their attendance at lectures, they throw their hearts into their practical work, they read early and late ; but after a time the old temptation comes over them, a temptation as old as human nature itself, one that assails every age and every path in life, the temptation which the old Israelites felt when

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"The soul of the people was much discouraged because of the length of the way." Men get tired of continuous study, their hearts grow sick under the monotonous daily grind. The more buoyant spirits feel their youth and health strong within them, they relax their rules, they go into society, they begin to spend their evenings in ways more pleasant than in the dry digestion of books; the hard bit of reading is slurred over, the looking up of the lecture notes is put off. "What matter," they think, "it can soon be made up." And so the man becomes an idle man, half-hearted in all that he does, and the grand powers within him lie fallow for want of that earnest persistent exercise of them which alone can bring out their latent strength and make the student all that he might be.

But it would not be fair to attribute all failures to this cause. There are some men who fall short, not so much from want of application as from lack of hopefulness. They do not remember their reading as they wish; they do not grasp scientific principles as they expected; difficulties thicken; they grow somewhat bewildered with the extent and variety of knowledge required, and at last give up in despair that engrossing effort which alone can carry them through. "What is the use," they say, as they shirk the harder points, and lay the blame on the system of instruction which should fall on their want of confidence in themselves. These are commonly men of no brilliant talent, yet their brains would serve them faithfully enough if they would only put forth mettle. Let such believe the truth that fair average abilities, well used, often carry their owner above the heads of abler men—the genius rarely makes a successful practitioner; but the careful hard-working student who feels that he must grind up his subject with plodding pains before he can make it a part of himself, and who acts on this impression, develops the elements of life-long success during his academic course.

To each of you, gentlemen, I would give the same advice. This feeling of disgust and weariness in study, this disheartening sense of want of progress, is natural; be prepared for it, meet it like a man; the mere effort will draw out the energy you hold in reserve, and you may find, perchance, as many a student has

found before you, that the duties taken up with distaste become attractive in the doing of them, if only from that sense of victory over the lower self within us which is, I suppose, one of the most exhilarating and comfortable feelings that any man can possess.

Never lose sight of the end and object of all your studies; the cure of disease and the alleviation of suffering. Some of you will soon be placed in the chamber of the sick, by the bed-side of the dying, and the issues of life and death may be in your hands. Think of this now, and while you have time use your talents aright. Your lives will be a constant warfare against a common enemy, implacable, often irresistible, who spares neither age nor sex, and who, too often, as the memories of the past week remind us, turns and bitterly avenges the victories of those who have many a time snatched victims from his grasp.

Gentlemen, our meeting to-day is a sad one, for sorrow is in all our hearts. One * who had endeared himself to us all has passed to that shadow land, which sooner or later awaits each one of us. Stricken down in the flower of his manhood, checked almost at the outset of his professional labours, it is inexpressibly sad that this fine life, so hopeful, so full of promise, should have been thus suddenly removed. This day week his cheerful, honest face was seen in the hospital wards—to-day the mourners follow his body to the grave. I need not recount to you who have appreciated his uniform kindness in the hospital his many good qualities, nor need I speak of the talents to which our university awarded her highest honours; I will rather dwell upon the deep regret of the profession at the loss of one whom we were proud to number among us, and ask the students to imitate that zeal and faithfulness which marked his short career, and which will long make his memory beloved and honoured among those he served.

In conclusion, gentlemen, let me urge upon you all to work diligently in the pursuit of that thorough knowledge of the science of medicine, which alone will make the practice of it satisfactory. And above all things do not regard the profession

* Dr. CLINE, House Surgeon, Montreal General Hospital.

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as a mere means of earning a livelihood, and so enter upon it simply as a business. It is indeed a pitiable sight to see a medical man neglectful of the higher interests of his profession, and given over wholly to the pursuit of wealth.

Remember, you enter upon a glorious heritage ; you will reap where you have not sown, and gather where you have not strawed, and the knowledge which it is your privilege to-day to acquire so easily has cost others much. We are all of us debtors to our profession : let us then, being mindful of those that come after endeavour to add our little fragments to the pile.

And now, remembering that we have other duties towards you than teaching the details of your profession, I would on this occasion earnestly impress upon you the necessity of living upright, honest, and sober lives. The way of the medical student is beset with many temptations, and too often the track he leaves is marked by as many lapses ; a zig-zag path,

"To right or left, eternal swervin'."

Above all things be strictly temperate. I will not say that you are in duty bound to give up the use of stimulants altogether—though my own convictions on this point are very strong,—but this I do say, that the slightest habitual over-indulgence is as the small flaw in some dyke that forms the barrier to a mighty flood, which widening that flaw day by day, sooner or later drowns every fair promise and brings inevitable ruin.

To the thoughtful among you the speculative aspect of modern science will sooner or later prove attractive. Do not get entangled too deeply. I would rather give each of you good old Sir Thomas Browne's advice : not to let these matters stretch your pia-mater. Lastly, you will not only be better, but happier men, if you endeavour to do your duty day by day, not from self interest, not from any outside aim however high, but simply because it is right, content to let the reward come when it will.

"Knowest thou *Yesterday* its aim and reason ?
Worked thou well *To-day*, for worthy things ?
Then calmly wait *To-morrow's* hidden season,
And fear not thou, what hap soe'er it brings !"

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Reprint

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XV
CASE OF

Progressive Pernicious Anæmia

(IDIOPATHIC OF ADDISON.)

BY

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Dr

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CASE OF
Progressive Pernicious Anæmia

(IDIOPATHIC OF ADDISON.)

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A CASE OF
PROGRESSIVE PERNICIOUS ANÆMIA.

(IDIOPATHIC OF ADDISON.)

The following case occurring in the practice of Dr. Gardner, is recorded as a contribution to the literature of a disease, rare, but by no means new, in any sense, concerning the pathology of which we have still a good deal to learn, and concerning the successful treatment of which we as yet know nothing.

G. A., æt. 52, a native of England, employed in a spike factory, first came under observation on the 5th November, 1876. He is a thin, spare, moderately well-built man of average stature, and with gray hair and beard.

He is one of a large family, all of whom, except some who died in infancy, are now alive. His mother was very subject to diarrhoea. All of the family have had at one time or another serious illnesses, which, however, in their nature, have no bearing on the present case. Two or three members of the family have had a tendency to bleeding at the nose.

At the age of between six and seven, shortly after coming to Canada, he had a long illness of five or six months duration, the nature of which, beyond the fact that it was attended with fever of remittent type, could not be ascertained. After recovering from this illness, he continued to be very healthy and active, suffering from little except somewhat frequent, slight, and easily-controlled bleedings from the nose. He never had had free bleeding from slight wounds. He was, however, subject to occasional attacks of diarrhœa. During the last few years he had occasional attacks of lumbago, and pains in some of his joints. None of these complaints prevented him for more than a few days from continuing his employment, which, until within some months previous to his being laid up, involved a great deal of muscular exertion.

About five years ago he lost, within three months, the only two sons of his family, and his friends assert that, although he did not display much emotion, he took the bereavement very much to heart, and that since then his health has greatly failed, that in particular he has become weaker and lost colour.

Nearly two years ago this became so decided, that his friends induced him to go away for change of air. He accordingly went to Toronto on a visit to a sister. During the first few days he felt better, but after exposure to cold and wet he was seized with an illness, setting in with rigors, and attended with cough, bloody sputa, and delirium. This illness lasted a fortnight, and was called by his medical attendant congestion of the lungs.

Ever since this illness he has been gradually growing paler and weaker, and liable during the summers, especially that of 1876, to frequent diarrhœa, never very severe, but rather constant. He would often have in the morning one or two loose motions, and during the day have no further trouble from it.

The symptoms of which he specially complained were weakness, attacks of shortness of breath, when he walked in the cold air, especially if he faced a wind, and diarrhœa—five or six motions in each twenty-four hours. Notwithstanding these symptoms he had been attending regularly to his occupation, which, however, did not involve much muscular

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exertion. At this time the most striking feature of his case was a remarkable waxy pallor of the skin and mucous membranes, and a pearly appearance of the white of the eyes. He is somewhat deaf; this he attributes to his occupation in a noisy workshop.

Pulse rather more frequent than normal; temperature normal. Appetite by his own account and that of his friends, is good—he is able to eat meat; suffers no distress after food. Sleeps very soundly, and sleeps a great deal, much more than previous to the failure of his health. If he sits down and is let alone he is sure to go asleep. Is compelled to be up two or three times each night to make water. Urine very highly coloured; quantity in twenty-four hours thirty-four to forty ounces; specific gravity varied from 1012 to 1016 at different times; no albumen; no sugar; no bile pigment; no tube casts.

Complains of some numbness of his fingers, hands and fore-arms; has difficulty in buttoning his clothes, or in using his tools. Complains of a throbbing, rushing sensation in his temples. Says that he has suffered from decided diarrhoea for rather more than a month, but the number of motions in each twenty four hours has not exceeded five or six. They have been painless and free from blood. Physical examination of the chest reveals nothing abnormal. The superficial cardiac dulness is normal in extent; the apex-beat natural in position; heart-sounds not specially changed—the first sound perhaps less accentuated than normal. There is a distinct bruit in the vessels of the neck and upper part of the chest.

The spleen is normal in size, or at all events not enlarged; the liver not enlarged.

The most careful examination reveals nowhere any pigmentation or bronzing of the skin. There is not the slightest evidence of enlargement of any of the superficial lymphatic glands. The symptom of which he complained most was the shortness of breath, which, as already mentioned, came on when he attempted to walk facing a wind, and was so urgent as to compel him to stop for a minute or two till he recovered his breath.



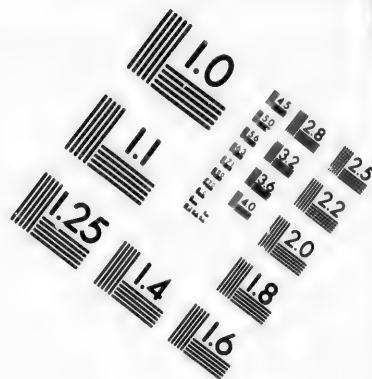
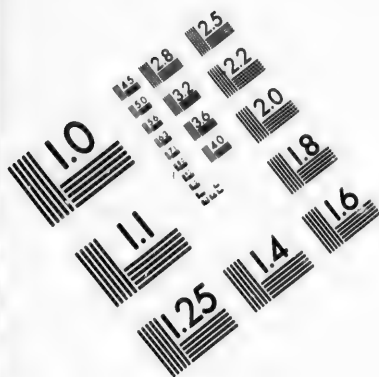
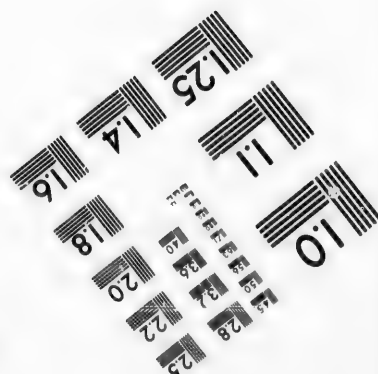
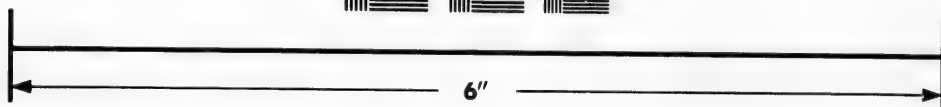
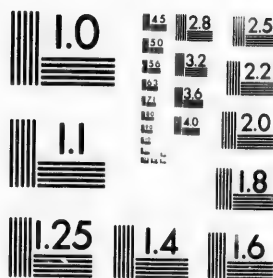


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The liq. ferri pernitratis was prescribed in doses of fifteen minims in a wine glassful of water three times a day, and also a diet from which vegetables and fruits were to be excluded. At the end of a week he returned to say that his diarrhœa had almost ceased, and that he fancied himself a little better. As on the previous occasion, he had walked from his house—fully three-quarters of a mile. There was no other change to note in the symptoms.

He continued to come regularly at intervals of a week for the next three weeks. During this time the diarrhœa had entirely left him; he was, he said, eating fairly, yet he was growing steadily weaker. The numbness of the fingers, hands and forearms was more marked, the difficulty in buttoning his clothes greater, the throbbing and rushing sensations in the head more distressing and the drowsiness more troublesome. A loud systolic bruit, much intensified by exertion, had developed in the region of the heart, loudest at the base, but heard also at the apex. The murmur in the vessels of the neck had become exceedingly loud.

At this time there was no œdema of face or ankles. The attacks of dyspnœa had been much mitigated by wearing a respirator over the mouth on going into the cold air.

He continued to take the pernitrate of iron during the first three weeks, but the only effect noticed from its use, if, indeed, it deserves the credit, was the cessation of the diarrhœa. The ammonio-citrate was then given instead for the next two weeks, but without the least benefit. Cod liver oil was next prescribed, but it disagreed so markedly that it was discontinued at once. He had not been seen for a fortnight, when, on the 29th December, a message was received asking that he should be seen at his house. There was little change to note in his condition, other than an intensification of the symptoms previously noted. The pallor was more intense, the weakness greater, the drowsiness and deafness more marked, but in addition there was slight œdema of the ankles and eyelids. Vallet's pills were now prescribed and taken for a week, but without the slightest benefit, as he continued to grow steadily weaker and worse, being scarcely

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able to leave his bed. On the evening of the 11th January of the present year, an urgent message to see him was received. On reaching his house it was found that on being assisted out of bed to make water, he had had an attack, apparently syncopal in its nature, and that at times, especially when left to himself, he was rambling and incoherent. He, however, answered questions correctly. He was very restless; pulse 110, temperature 102° . He had also been vomiting.

Jan. 12th.—Noon—Temperature has fallen to 101° . Other symptoms as at last report. Dr. Howard, Professor of Medicine, McGill University, saw him in consultation at this visit, and fully concurred in the diagnosis.

At 10 p. m. the pulse was 105 and the temperature 97.5° . Retention of urine, requiring the use of the catheter. Urine very high-colored, red-brown, acidity normal, no albumen, sugar or bile-pigment; specific gravity, 1016.

Jan. 13th.—11 a. m.—Pulse 98, temperature, 97.3° . Not so restless, still incoherent; vomits everything; catheter has to be introduced regularly.

Jan. 14th.—Died at 3 a. m.

The blood examined during life presented the following appearances in a specimen obtained, in a capillary tube, fifteen hours before death, and examined without the addition of any reagent, 30" after withdrawal. (Hartnack, No. 9 im. and Oc. 3.)

About one-half of the red blood corpuscles run together to form rouleaux. The majority of them appear of large size, but do not present the characteristic round contours of these bodies; many are ovoid, others lozenge-shaped, or of various forms, with irregular projections and processes. Isolated corpuscles look of the natural pale yellow colour, but the alternating light and dark centre with the change of focus is not so distinct as usual. On touching the top cover and causing them to roll over, many do not present the biconcave appearance, but look thin and flattened out. A limited number are crenated. In each field certain small round red corpuscles are seen, sometimes as many as six or eight. They are spheres, not biconcave, of

a pale yellow colour, occasionally crenated or irregular in form.

The measurements of some of the coloured elements are given below (Hartnack No. 16 im.), from which an accurate idea is obtained of the remarkable discrepancies in size. About forty measurements were made of corpuscles taken at random in two or three specimens obtained a few days before death. Of these one was $\frac{1}{33}$ " by $\frac{1}{10}$ ", being somewhat elongated. Five ranged from $\frac{1}{55}$ " to $\frac{1}{15}$ ", these being the extremes. In twenty-two the range was from $\frac{1}{50}$ " to $\frac{1}{20}$ ". In this group the usual looking red disks occurred. In five the diameter varied from between $\frac{1}{50}$ " and $\frac{1}{20}$ ". In five the diameter was less than the $\frac{1}{50}$ ", the lowest being $\frac{1}{74}$ ".

Prolonged examination failed to discover a single nucleated red corpuscle.

The colourless corpuscles did not appear relatively increased. One or two were seen in each field of the No. 9 and 3. The measurements in five corpuscles ranged from $\frac{1}{50}$ " to $\frac{1}{20}$ ". They were quite natural looking, and displayed a remarkable degree of vitality. In a slide mounted and surrounded with paraffine at 1 P.M., the amœboid movements were very active, the temperature of the room being about 60°. At 7 P.M. the slide was carried in the hand a distance of a quarter of a mile to the house of a friend (temperature 14.2° F.), and the irregular changes in outline were still observed, and continued until 8:40, when the observation was omitted. There was an entire absence of Schultze's granular masses.

Autopsy.—Thirty-two hours after death.

Body that of a well-built man of fair muscular development. Hair grey. No emaciation; panniculus adiposus well developed, especially over abdomen. Skin of extraordinary pallor.

* It may be here mentioned that the statement of Ranvier, *Traité d'Histologie* (p. 210), that the amœboid movements of white blood corpuscles do not go on at ordinary temperatures is incorrect. In University College Laboratory, London, it was found on one occasion that the amœboid movement continued in the colourless corpuscles twenty-four hours after removal from the body. The blood was sealed in a capillary tube, and remained at the ordinary temperature in the month of June.

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with slight lemon tint, the shoulders marked with patches of deeper yellow hue. A few old psoriasis spots seen in the region of the elbows and knees. No petechiæ. *Lineæ albicantiæ* in the skin of groins, and upper and outer aspect of thighs, and on the outer edge of anterior folds of axillæ. Fingers slightly clubbed, and the nails of both hands markedly incurvated. Rigor mortis moderately well marked. Post mortem stains scarcely perceptible. No enlargement of the superficial lymphatic glands. No cadaveric odour.

Brain.—Not examined.

On making the preliminary incision a layer of deep yellow fat, fully an inch in thickness, is cut through over the abdomen. Muscles of the thorax of a remarkably healthy red colour. In the abdominal cavity the position of the viscera normal. Omentum moderately fatty. In the thorax a considerable amount of fat over the pericardium. The left pleural sac contains twelve ounces of bloody, yellowish-tinged, serum. A few strong adhesions posteriorly. In the right pleural sac ten to twelve ounces of fluid of the same character. Adhesions more numerous at apex and sides.

Pericardium.—Contains six drachms of a yellowish, bloody serum. No ecchymoses on either leaf.

Heart.—Large, excessively flabby. Sub-pericardial fat abundant about the base and in the anterior ventricular groove. Patch of attrition over upper part of right ventricle in front, and another behind, near the inferior vena cava. On opening the heart in situ an ounce of blood, with one small coagulum, in the cavities of the right side, and ten drachms in those of the left. Organ flaccid, and walls collapsed when laid on the table. Right auricle normal. Right ventricle somewhat dilated, the endocardium stained by imbibition. Tricuspid valves a little thickened and gelatinous at the edges; orifice of normal size. Pulmonary semi-lunar valves healthy, one segment fenestrated. Cavity of left ventricle large, walls of normal thickness. Mitral valves quite healthy, a little stained; orifice of proper size. Aortic semi-lunar valves a little opaque; slight atheroma at their bases, and on the aorta opposite their

free borders. Sinuses of Valsalva very distinct. Nothing abnormal in the left auricle. Muscle substance of the organ exceedingly pale, having a yellowish, faded-leaf appearance, especially marked in the walls of the left ventricle.

Aorta.; both arch and trunk of full size. Beyond the left sub-clavian there is a flattened patch of atheroma, about the size of a half-penny.

Lungs.—Deeply pigmented; crepitant throughout; lower lobes œdematous and dark in colour posteriorly. The mucous membrane of the *Trachea* at the bifurcation, and extending irregularly nearly to the larynx, is represented by a number of bony plates, lying immediately upon the cartilages, which are themselves very dense, and partially ossified.

Spleen.—Weight, six ounces; soft and flabby. Capsule a little opaque. On section, pulp soft, of a light brownish-red colour. Trabeculae distinct. Malpighian corpuscles not evident. Very little blood in the organ; none could be obtained from the splenic vein.

Left Kidney.—Length, 5". Unusual amount of superficial fat. Capsule loosely attached, and on removal leaves a very anæmic-looking organ. No atrophy of the cortex, which is pale and bloodless. Pyramids, except at the bases, also pale.

Right Kidney, 4½" long, dark red in colour, uniformly congested, forming a striking contrast to the other. Capsule easily detached; stellate veins prominent. On section, both cortex and medulla contain much blood.

Supra-renal Capsules.—The right is soft in the centre, and somewhat larger than the left, but nothing unusual about either.

Bladder.—Distended with pale urine. Mucous membrane healthy looking. Prostate gland of full size.

Tonsils and glands at root of tongue not enlarged. Several ecchymoses beneath the mucous membrane of the anterior wall of the pharynx. *Œsophagus* presents nothing unusual; a few small extravasations are noticed near the cardia.

Mucous membrane of *stomach* pale, and at the cardiac end thin; at the pylorus it is thicker. *Duodenum* healthy; common

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bile duct is pervious. *Jejunum* contains a quantity of dirty yellow mucus. Mucous membrane is pale. In the *ileum*, Peyer's patches are scarcely perceptible; the solitary glands towards the ileo-cæcal valve are alone distinct. In the *large bowel* the mucous membrane is anæmic. No ulceration. *Scybalæ* in transverse and descending colon.

Liver.—Rather small, of a light yellow colour, especially in the left lobe. Capsule smooth. On section a small quantity of liquid blood is seen in some of the hepatic veins. In places there is a very slight injection of the intra-lobular veins, which relieves the otherwise uniformly pale surface.

Gall-bladder.—Full of dark tarry bile.

Pancreas.—Looks healthy.

Abdominal blood-vessels almost entirely empty. No blood in inferior vena cava or aorta. Intima of both healthy-looking. *Thoracic Duct* pervious throughout. Mesenteric and retro-peritoneal *lymphatic glands* small, the former unusually so, requiring considerable searching to obtain any. The amount of blood in the body appeared remarkably diminished, and it was only by pressing along the limbs that sufficient could be obtained from the veins to fill a small homœopathic phial.

Piece of the sternum, the upper half of right fibula, the inner third of left clavicle, half a rib, and one of the last dorsal vertebræ were removed for the examination of the marrow. Blood was collected from the heart, and junction of left jugular vein with the sub-clavian.

A striking feature in the autopsy is the extreme anæmia of the organs, their almost entire bloodlessness, and consequent pallor, the right kidney excepted

HISTOLOGICAL EXAMINATION.

The blood taken from heart and veins shows the same general characters noticed during life. Prolonged examination of different specimens made for this special object resulted in the detection of two nucleated red blood corpuscles.

Heart.—The fibres are in a condition of extreme fatty degeneration, the striæ being obscured by the number of densely

crowded droplets and fine molecular fat ; only here and there a fibre occurs in which the striæ are faintly seen. In teased preparations numerous short bits occur, together with oil-drops and granules of fatty matter. In places there appears to be a good deal of interfibrillar connective tissue with fat cells.

Muscles of the Trunk.—The fibres of the thoracic muscles—which were observed to be of such a natural appearance—present no trace of fatty degeneration.

Spleen.—The ordinary corpuscles of the pulp, together with elongated, sometimes branched, cells of the retiform tissue are the chief elements seen in teased specimens. The red corpuscles have lost their colouring matter. A few cells containing red blood corpuscles are seen, but no nucleated red cells.

Kidney.—Teased preparations show the epithelium of the tubules, both in the cortex and pyramids, covered with fatty matter in the form of minute drops and fine granules ; nowhere, not even in the large collecting tubes, are the cells distinct. The Malpighian corpuscles also contain many granules and small oil-drops, and the same exist abundantly in the field.

Liver.—Cells are stuffed with oil-drops ; none noticed without them, while in many the protoplasm and nucleus are entirely obscured. Free fat exists infiltrated between the cells, and in the field. In a few, bile pigment is seen.

Mesenteric Glands.—Teased portions present a large number of perfectly normal-looking lymph corpuscles, among which the connective tissue elements occur in the usual proportion. Many of the small vessels and capillaries have their walls uniformly studded with fat grains, and may be traced as dark branching lines. In others, the deposition is not so extensive.

Nothing abnormal observed in the axillary lymphatic glands.

Medulla of Bones.—The marrow of all the bones examined—sternum, rib, clavicle, vertebra, fibula—is of a dark violet-red colour, thick, about the consistence and colour of the spleen pulp in fever. In the clavicle it is more diffuent, of a lighter red colour, and to the naked eye looks a little fatty—an appearance not noticeable in the other bones, not even in the shaft of the fibula.

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On microscopical examination, the following elements were found :—

(1) Colourless corpuscles—marrow cells—of various size, with granular protoplasm, and bold vesicular nuclei. The greater number of these are larger than white blood corpuscles, and usually have a single nucleus, sometimes two. Others are smaller, more approaching the blood corpuscles in form, while in all the specimens examined, small round cells, like ordinary lymph corpuscles, are also found. The above represent the common colourless elements found in marrow, and they form the majority of the corpuscles in the field. In eight of the larger cells the extremes of measurements were $1.571''$ by $1.333''$ and $2.200''$ by $3.375''$.

(2) Coloured blood corpuscles, of which two varieties are seen; (a) ordinary biconcave disks, somewhat irregular in shape, and often, as noticed in the blood during life, provided with long processes. They are abundant, forming the large proportion of coloured elements. In the fibula, sternum, and rib the colouring matter is retained, while in the vertebra and clavicle it has disappeared from most of the corpuscles, and they are recognizable only as outlines. (b) Small round red corpuscles, non-nucleated, from one-quarter to one-half the size of ordinary corpuscles, and similar in appearance to the small forms seen in the blood. They occur most numerous in the marrow of the fibula, where they form fully one-fourth of the coloured corpuscles. In the sternum and ribs they are not so abundant, though occurring in each field. As described in the blood itself, they do not appear to be biconcave disks, but spheres. The colouration is quite as intense as in form a, and a few were observed to be crenated.

(3) Nucleated red corpuscles, the "transitional" forms of Neumann, which are numerous in the sternum and rib, less so in the fibula, while in the clavicle and vertebra they occur scantily, or, owing to the general decolorization of the red corpuscles in these bones, are seen with difficulty. As shown by the measurements given below, they are as a rule larger than ordinary blood corpuscles, but present, like them, a perfectly homogene-

ous coloured stroma, in which a finely granular nucleus is imbedded. They are spheres, not biconcave, as a rule round, though frequently irregular in outline, or with one end pointed and prolonged. The intensity of the colouration in most cases equalled that of the ordinary red corpuscles, in some instances being deeper, in others not so marked. The nuclei are either round or elliptical, and occupy from one-quarter to one-half of the body of the cell (see measurements). They are solid, granular, and inside the corpuscle look coloured, though not so deep as the surrounding substance. The presence of nucleolus could not be determined. The position in the cells is variable; in specimens examined within a short time after the post-mortem they appeared to be chiefly centric, but in preparations taken the next day very many of them had become quite peripheral, while others had protruded almost through the corpuscle, when it could be clearly seen that the nucleus was colourless. In several instances the nuclei are seen to be entirely outside the cells, though remaining attached to them. In this condition they look not unlike the small lymphoid marrow cells, and it is only the large size of the corpuscles to which they adhere, and the fact that in the same field others may be seen half-way out, that enables a correct opinion to be formed. In three or four instances dumb-bell-shaped nuclei were noticed. Cells with two nuclei were not uncommon, and instances with three and four were observed. As remarked above, the nucleated red forms are numerous in the sternum and rib, six to eight being seen at once in the field of the No. 9 im. and 3, while in the fibula not more than three or four were noticed in any single field. In fifteen measurements of these forms, eleven were above the $\frac{70}{100}$ ''; five being $\frac{74}{100}$ '' . The following measurements are of three corpuscles with their contained nuclei:—(1) $\frac{177}{174}$ '' by $\frac{72}{70}$ ''; nucleus $\frac{76}{75}$ '' by $\frac{23}{26}$ '' . (2) $\frac{72}{70}$ '' by $\frac{73}{71}$ ''; nucleus $\frac{73}{70}$ '' by $\frac{20}{20}$ '' . (3) $\frac{70}{67}$ '' by $\frac{79}{64}$ ''; nucleus $\frac{36}{36}$ '' by $\frac{22}{25}$ '' . A good idea of the irregularity in outline of these corpuscles and the slightly elliptical character of the nuclei may be gathered from the above.

(4) Cells containing red blood corpuscles. These are very

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abundant in the marrow of the vertebra, three or four occurring in the field at once, and containing from five to six red corpuscles, the colour and outlines of which in most cases are preserved. In the sternum and rib they are not nearly so numerous; in the fibula and clavicle they were not observed.

(5) Myeloplques, of which one or two only were met with in the marrow of the sternum and rib. Neither in the shaft nor epiphysis of the fibula could these forms be determined.

(6) Fat cells, which are present in marrow of the clavicle in small numbers, absent in the sternum, vertebra and rib. In marrow from the fibula an oil-drop is occasionally met with in the field, but here also they are almost entirely absent.

(7) The octahedra crystals, first described by Charcot, and which always occur in the marrow from twelve to thirty-six hours after death.

REMARKS.—Apart from the clinical features and general pathological appearances of the above case, which show it to be an exceedingly typical one, there are two points of special interest, viz., the appearance of the blood, and the condition of the bone marrow, both of which are deserving of a few comments.

Prof. Eichorst has drawn attention in a short note* to the presence in the blood of patients suffering with pernicious anæmia of exceedingly small red corpuscles, which he regards as pathognomonic of the disease, and affording a valuable diagnostic sign, being present in all of his cases, seven in number. The following are his own words:

“Some of the red globules are of normal size, but very pale and have lost their tendency to form rouleaux, others scarcely attain $\frac{1}{2}$ the diameter of a normal, perfect corpuscle, so that they look like small drops of fat tinged red, and have not their biconcave appearance.” Towards the latter stages of the disease he states that they increase, so that before death they may equal in number the common forms.

The histological examination, both before and after death,

* Centralblatt f. die. Med. Wissen. June 24th, 1876.

and the measurements above given, show that in this instance the blood did contain an unusual number of small coloured elements, and is so far confirmatory of Eichorst's statement. Though not abundant, they were quite numerous enough to attract attention, and offered a striking contrast to the other red corpuscles about them, many of which were large, flattened out, and less biconcave than usual. A great variation in size was noticed in all the specimens examined, and range as given in the measurements, from $\frac{1}{100}$ " to $\frac{1}{200}$ " must be regarded as very remarkable. That these tiny elements are red corpuscles there can be no doubt, as with No. 16 Hartnack (1-36th) they appear homogeneous, of a pale yellow colour, and, like the larger forms, are sometimes crenated. In the third case reported in Dr. Howard's paper on the subject,* the blood of which one of us (Dr. O.) had an opportunity of examining in the spring of 1875, the note on the appearances of the blood is as follows: "There is a somewhat unusual variation in size among the red corpuscles, many of them scarcely measure the $\frac{1}{200}$ th part of an inch in diameter. The white corpuscles also present slight variations in size and are more granular than normal. Max Schultze's granular masses are abundant." Cohnheim, in a case which will be more fully referred to hereafter, states that the presence of the small blood corpuscles was established. Quincke† also speaks of the inequalities in the size of the red blood corpuscles, many of which were small and round. In three of his cases these smaller forms presented great irregularities in contour. These are, I believe, the only positive observations on this point. On the other hand, there is a note by Prof. Grainger Stewart of Edinburgh,‡ in which he states, that the blood in two cases of pernicious anæmia, under treatment at the time, did not present the small red corpuscles described by Eichorst. Among recent cases in which the blood was carefully examined,

* Read before the International Medical Congress at Philadelphia, and being published in the forthcoming Report.

† Volkmann's *Sammlung Klinischer Vorträge*, No. 100., translated in *Medical Times and Gazette*, Oct. 14th, 1876.

‡ *Brit. Medical Journal*, July 8th, 1876.

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and no mention made either of small forms or great variations in size are those of Pepper,* Scheby-Buch,† Pye Smith,‡ Lepine.§ Bradford,|| in his case, made a most careful examination of the blood, and reports not much variation in size, but that all are rather smaller than usual. In Ferrand's case¶ many of the red blood corpuscles were larger than normal, no mention is made of any diminution in size. In Bradbury's case** the red corpuscles were larger than normal, pale, and exceedingly irregular in shape. No small forms were noticed. Burger†† did not notice any great variations in size, but a peculiar paleness about them. Immermann‡‡ makes no mention of alterations in form or size in the red corpuscles.

The presence of very small red disks in healthy blood is not common, still, one of us (Dr. O.) has occasionally measured forms not $\frac{1}{100}$ th of an inch in diameter, both in his own and in the blood of other quite healthy individuals. Laptschinsky§§ has also found these small corpuscles in the blood of patients with various febrile affections, and speaks of them as being numerous, about $\frac{1}{2}$ the size of ordinary red corpuscles, some having an intensely red colour, whilst others are pale. In the blood from the above reported case, drawn in capillary tubes, and not examined until some hours after, many of the red corpuscles appear as deeply coloured spheres, slightly smaller than natural. This is a physical alteration, resulting apparently in a change from a disk-shape to a sphere, with, perhaps, a condensation of the corpuscle. These forms were not present in perfectly fresh blood, but could be seen in the slide six or eight hours

* Amer. Journal of Med. Sciences, Oct. 1875.

† Deutsches Archiv. f. Klin. Medicin, April, 1876.

‡ Virchow's Archiv. Bd. 65. hft. 4. Dec. 1875.

§ Bulletin General de Therapeutique, 30 Julliet, 1876.

|| Boston Medical and Surgical Journal, May, 1876.

¶ Bulletin General de Therapeutique, Dec. 15, 1876.

** Brit. Medical Journal, Dec. 30, 1876.

†† Berliner Klin. Wochenschrift, No. 33, 1876.

‡‡ Ziemssen's Handbuch der speciellen Path. and Therap. Ed. xiii. Art. Pro. Pernic. Anæm., 1875.

§§ Centralblatt f. d. Med. Wissen. No. 42, 1874.

after mounting. It is interesting to remark with reference to the large corpuscles, that Hayem* states that during a long course of iron—just such as this man had been subjected to—the red disks undergo an increase in volume.

Until we possess more definite knowledge than we do at present of the variation in size of the red corpuscles in constitutional and febrile diseases, it would be hasty, from the limited number of observations, to conclude that the presence of the small coloured corpuscles is pathognomonic of, or even affords a positive diagnostic sign in, progressive pernicious anæmia. It remains for subsequent observers to note accurately the size of the red corpuscles in this disease, and it will not be long before we are in a position to arrive at a satisfactory conclusion on this interesting point.

In a disease like pernicious anæmia, which after death is is not characterized by any important lesion in the viscera or glands, it was natural that attention should be directed to the bone marrow, a structure now ranked among the blood-forming organs, and which in leukæmia, and pseudo-leukæmia (anæmia lymphatica, or Hodgkin's disease) has been found remarkably altered, so much so that myelogenous forms of both have been described. With the two affections just named the one in question is closely allied, and in its clinical features almost identical. From the splenic and lymphatic forms of both, it is distinguished by the absence of enlargement of the spleen and lymphatic glands, and additionally from leukæmia by the failure of any increase in the white blood corpuscles. In those rare cases of leukæmia, where the disease is confined to the bone marrow—myelogenous form—the only distinguishing feature is the excessive number of colourless corpuscles in the blood, with, perhaps, tenderness over the affected bones (Mosler). Immermann† quotes a case in illustration of this. In the still rarer cases of myelogenous pseudo-leukæmia, where the affection is uncomplicated with disease of the spleen or lymphatic glands, a differential diagnosis would be impossible, (compare the remarkable cases

* Bulletin General de Therapeutique, Dec. 15th 1876.

† Loc. Cit. p. 651.

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§ Loc. cit.

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** Virchow

given by Wood*). It is not to be wondered at that some writers (Immermann and Jaccoud†) should hint at the identity of the two diseases, or that Pepper, encouraged by the appearance of the marrow in one of his cases, should state that progressive pernicious anæmia was "merely the simple medullary form of pseudo-leukæmia."

The evidence of an implication of the marrow in this disease rests upon the following reports: the first case in which it was examined was one of Pepper's, in which the marrow of the radius and sternum was "made up almost entirely of small granular cells." Passing over a case observed by Fede,‡ and recorded as one of pernicious anæmia, but which ought to be regarded as a well-marked myelogenous pseudo-leukæmia, the next observation is by Scheby-Buch,§ in one of whose cases the marrow of the radius was pale red in colour, and contained numerous cells like white blood corpuscles, and very few red corpuscles or fat cells. In Lepine's|| case nothing unusual was found. Burger¶ states that there was no affection of the marrow in his case. By far the most extended account of the changes in the marrow in this disease is that given by Cohnheim in a letter to Virchow.** The following is a summary of the appearances described: Marrow of all the bones intensely red; fat almost entirely absent. Microscopically there were (1), ordinary marrow cells of various sizes, some small and lymphoid in character, others large and with vesicular nuclei; (2.) coloured elements in almost equal number, of these the common, biconcave, red blood corpuscles formed a decided minority, while the number of red non-nucleated corpuscles of various dimensions was very evident. The smallest of these had the diameter of normal red blood corpuscles, the largest were more than

* Am. Journ. of Medical Sciences, Oct. 1871.

† Nouv. Dict. de Med. et de Chirurg. Leucocythémie.

‡ Quoted in Centralblatt, f. die Med. Wissen., Oct. 16th, 1875.

§ Loc. cit.

|| Loc. cit.

¶ Loc. cit. No. 34, 1876.

** Virchow. Archiv. Bd. lxxviii, Hft., 2. Oct. 26, 1876.

double the size of colourless blood corpuscles, and between them forms intermediate in size. (3.) Nucleated red corpuscles in great abundance, and of various sizes, the majority equalling in size the smaller of the true marrow cells. The blood examined after death was also found to contain a few of the nucleated red corpuscles. In Quincke's article no details are given, and this part of the question is disposed of with the remark: "The marrow of the bone showed no abnormality." In Bradbury's case, the red marrow from the right tibia looked natural, and was made up almost entirely of granular spheroidal cells, like white blood corpuscles. In that from the sternum the cells were much larger, and red globules more abundant. Coloured corpuscles were not numerous.

These are the only facts for and against the view that pernicious anæmia is the medullary form of pseudo-leukæmia. The general statement of Quincke, and the more definite ones of Lepine and Burger, are not very satisfactory, as no details are given; still, they must be accepted as negative evidence. It may be held with Bradbury* that the changes in the marrow of the sternum and radius in Pepper's case were scarcely sufficient to indicate serious disease of that structure, as only the normal elements were found, though in the radius in slightly increased numbers, and the same may be said of Scheby-Buch's case. In Cohnheim's case and our own the constitution of the medulla was altered, and, in addition to ordinary marrow cells, it contained lymphoid corpuscles, embryonal forms,† and red blood corpuscles of various sizes. The detection, too, in both, of the embryonal forms in the blood, though in quite insignificant numbers, places them apart from the others; and on these grounds they alone are strictly comparable with myelogenous leukæmia. Indeed, the question at once arises whether we have not to do here with

* Loc Cit.

† In a recent note in the *Archiv. f. Mikroskop. Anatomic*, Bd. xii. p. 796, Neumann expresses a wish that the term "transitional," as applied to the nucleated red corpuscles, should be dropped, as involving an hypothesis about their origin, advanced rather too confidently by him. He would substitute the term "embryonal" or "developmental" form.

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an uncomplicated case of medullary pseudo-leukæmia, similar to one of those described by Wood*. A consideration of the symptoms will not help us, and the remarkable admission must be made, that while the ante-mortem diagnosis of pernicious anæmia was correct, a post-mortem one of pseudo-leukæmia might be equally so.

The absence of these changes in the marrow in the cases of Quinke, Lepine, and Burger proves that the disease in certain cases is independent of any affection of this structure; and we must either regard implication of the marrow as an accidental complication, having but little to do with the cause or progress of the disease, or refer all cases in which it is met with to the category of myelogenous affections. Can the state of the marrow be regarded as an accidental complication, a secondary change, depending on the grave constitutional disease? Our knowledge of the condition of this tissue in disease is not at all complete, and the only observations at hand on the subject are the following:

Neumann† met with great hyperplasia of the marrow in a case of Addison's disease.

Wood, in a paper already referred to, says, that he has "made a number of examinations of long bones taken from patients dead of various chronic diseases, and never, except in a single case, found any abundance of the leucocytes;" and this was probably a case of leukæmia.

In 14 examinations made by Dr. Osler of the marrow of the long bones, obtained chiefly from chronic Hospital cases, in only one was there found hyperplasia and marked alteration in its constitution; and in this instance there is a strong probability of the case belonging to the group under consideration.

Altogether, the few facts we have are opposed to the view that in chronic diseases, accompanied with anæmia and wasting, hyperplasia of the marrow of the long bones occurs as a secondary change.

Cohnheim‡ writing to Virchow, on his case, says, "You will

* Loc. Cit. p. 293.

† Quoted in Quarterly Journal of Microscopy, 1871.

‡ Loc. Cit. p. 382.

certainly agree with me in taking for granted that the above described condition of the marrow stands in intimate connection with the fatal disease of the patient. That in this affection (progressive pernicious anæmia) we have to deal with a profound disturbance in the constitution of the blood all observers are at one ; and, on the other hand, it can at present be no longer doubtful that an important disease of the marrow must have a serious influence on the composition of the blood."

With this statement we concur, and are inclined to regard the affection of the marrow in our case as the *fons et origo mali*.

Our best thanks are due to Dr. Howard, of McGill University, who in his lectures has long taught the existence of Addison's idiopathic anæmia, and who kindly allowed us to have access to the manuscript of his paper on the subject.

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CASE OF
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PERNICIOUS ANÆMIA.

CLINICAL REPORT,

BY

JOHN BELL, A.M., M.D.

PATHOLOGICAL REPORT, WITH REMARKS,

BY

WILLIAM OSLER, M.D.,

Professor of the Institutes of Medicine, McGill University.

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J. B., aged 47, a native of Leicester, England, a rubber weaver by trade, and a resident in this country since 1857, came under my care in 1875, suffering from weakness and loss of appetite, which symptoms, with appropriate treatment and dieting, disappeared. In May, 1876, they recurred, and persisted more or less throughout the year. In February of present year his condition became such as to require constant medical attention. His history is as follows: He is a man slightly under the medium height, but well built, complexion fair, intelligence good, family history good; one brother suffers from dyspepsia, another is epileptic. He is married and has six children, all strong and healthy. For the first ten years of residence in this country he farmed, following at the same time the occupation of a shoemaker. Subsequently he came to Montreal, and for eight months was a conductor on the street Railway, during which period he enjoyed excellent health. For the rest of his life he served as a felt cutter for overshoes in the Canada Rubber factory. His general health had always been good. About three years ago the purchase of a piece of property some distance out of town, and the anxiety consequent upon making the necessary payments, caused considerable mental worry, and he suffered at the time from general debility. About the same time two of his children had a mild form of typhoid fever. The chief symptoms he complains of are excessive weakness and indisposition to exertion, together with loss of appetite. The skin is blanched; mucous membranes pale, sclerotics pearly, and he suffers from palpitation and shortness of breath on exertion. On physical examination the organs are apparently healthy; heart sounds natural; liver and spleen not enlarged; no enlargement of external lymphatics. No increase in the colourless blood

corpuscles, but changes found in the red corpuscles, which will be noticed later on.

Ordered pill of reduced iron, grs. ii., and phosphorus $\frac{1}{50}$ gr.

March 14th. Has been depressed in spirits, and meditating suicide. Feels chilly, and has attacks of occasional vomiting, a murmur is audible at the base. Heart's beat feeble. Pulse, 104. Temperature, 99.5°.

17th. Vomited bile on getting up. Legs somewhat swollen; face puffy; complains of great weakness and shortness of breath, ringing in ears, and other signs of anæmia. Stopped the pills and ordered cit. of iron and strychnia. Temperature, 99.7. Pulse, 92.

22nd. Very little change. Bowels inclined to be constipated. Urine natural looking, no albumen; slight trace of sugar. Complains of indistinctness of vision. Sleeps well.

27th. Has been in bed since 24th. Hands and feet not so much swollen. Slight hacking cough. Feels too faint to sit up to have the bed made. Pulse and temperature about the same.

31st. Has had for two days vomiting and slight purging, which are now checked. Urine natural. Complains of numbness of left arm and hand. Vision impaired, sees peculiar coloured disks. Dr. Buller examined the eyes to-day and reports as follows:

Choroid unusually heavily pigmented, but apparently everywhere normal. Optic nerves pale, but not the pallor of atrophy, as there is no conspicuous absence of the smaller vessels which are always observable in the healthy optic papilla. On the surface of the right nerve the upper of the two small arteries which may generally be seen running transversely outwards towards the region of the macula lutea, present a peculiar appearance, the portion traversing the face of the nerve is much enlarged, somewhat fusiform, of a dark colour, like a retinal vein, but has not sharply defined walls. Just beyond the edge of the nerve this vessel is for a short distance almost normal in appearance, but further outwards it is obscured by a thin, superficial, streaky-looking extravasation of blood. The macula itself is occupied by an irregular dark red patch about half as large as the optic papilla, probably an extravasation of blood. There are a number of minute blood stains in the region of nerve and macula, nearly all of them thin and streaky, and generally close to some retinal vessel of moderate size. Some appear to be in intimate relation with the retinal veins, others with the arteries; they are all of the

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same dark venous colour. There is a slight haziness of the retina throughout the region occupied by extravasation, but apparently none towards the equator of the eyes. The arteries are decidedly paler and smaller than they should be in a state of health.

The patient speaks of seeing a dark spot about the size of a spectacle lens before the eye when he looks at any object, but thinks vision is not impaired.

The left eye was examined by the direct method only, and also showed numerous small retinal hæmorrhages similar to those described in the right eye. The region of the macula, however, was not minutely examined, the debility of the patient not permitting a more prolonged investigation.

April 4th.—Pulse 112, temperature 100.4°. Complains of tightness in chest, and pains in the head. Feels sick at stomach when he gets up. Numbness in both hands.

Feeling that he could not go on much longer, he asked to have transfusion performed, having been previously well instructed as to the chances of success, immediate and remote. The operation was accordingly performed on the 6th at 1.10 p.m., Dr. Buller kindly supplying the necessary amount of blood. I proposed transmitting the blood into one of the veins of the foot, but it was impossible to find one prominent enough, so that the median basilic of the right arm was selected. Ten ounces of blood were withdrawn from Dr. Buller, defibrinated by whipping with a wire egg-beater and passing through linen (lawn), the temperature being maintained by means of hot water. A v shaped incision was then made in the vein, and the nozzle of Aveling's transfusion apparatus introduced, and six ounces of blood pumped in without the patient exhibiting any uneasiness. The effect of the new blood was apparent in increased fullness of the superficial veins, a pinker color of the lips, and increased moisture of the skin. After removal of the nozzle from the vein it was found impossible to check the hæmorrhage by a compress, so that it was necessary to apply ligatures to both ends of the vein. It would have been better had these been placed in position before the vein was opened; as it was, one or two ounces of blood were lost. The operation lasted about ten minutes. Pulse at the time was 102, temperature 99.1°. Half an hour after he complained of feeling chilly, and the temperature began to rise; at the end of the hour rigors were well marked, accompanying every eighth or tenth expiration, and the temperature was 102°, the pulse 120, respirations 34. At the end of second

hour the rigors had diminished somewhat. Pulse 132, intermittent and feeble, temperature 103.1° . About three hours and a half after the operation the temperature was 104.1° , the highest it reached. Pulse and respirations about the same. He takes brandy and beef tea alternately every fifteen minutes. Passed $\frac{3}{4}$ iii. of normal urine, containing no albumen. Until midnight the temperature remained about 103° and pulse between 140 and 150; they then gradually fell, and at 8 a.m. temperature 100° , pulse 100, respirations 28. He slept tolerably well through the night, passed $\frac{5}{8}$ viii of normal urine, and towards morning had a large healthy looking liquid stool, getting out of bed for the purpose. He says he is stronger, and his mind is clearer than before the operation.

April 7th.—The temperature continued to fall, and at 8 o'clock in the evening was 99° . Urine was passed three times during the day, and he had one stool in the morning. The pulse is firmer, fuller, ranging from 102 to 112, and does not intermit. Takes nourishment well, only vomited once.

April 8th.—Slept at intervals through the night, and took stimulants and nourishment well. Passed urine several times. Complained a little of pain in the right arm, and was restless towards day break. The temperature gradually rose from 99° at 7 p.m. to 101° at 7 a.m., the pulse ranging from 110 to 120. Respirations 25 to 30. From 7 o'clock the temperature and pulse gradually rose, till at 12 the former was 104° , the latter 130, and very feeble. Takes brandy and beef tea every ten or fifteen minutes, and dozes at intervals. Respirations 140 and shallow. After 12 o'clock he became very restless, and did not care to take nourishment. The pulse rose to nearly 150, the respirations became more rapid and very shallow, and the temperature fell 102° . Breathing got more and more difficult, and he died at 1.40 p.m., about forty-eight hours after the transfusion.

AUTOPSY, TWENTY-FOUR HOURS AFTER DEATH.

Body that of a spare man, 5 feet 5 inches in height; complexion fair, hair light, whiskers red. The skin presents a yellowish tinge over the whole body, most marked on the face, neck, and shoulders. Rigor mortis well developed. Slight œdema of lower extremities. Four or five smooth white cicatrices on outer side of right leg. Freckles abundant on forearms. Panniculus adiposus thin.

Brain.—Skull unusually thick; marrow of diploe red. About

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2 oz. of serum escapes on removal of the dura mater. Vessels of the pia mater empty. Pacchionian granulations numerous. Brain substance pale, of good consistence. Nothing abnormal in the ventricles or ganglia at the base. The remarkable pallor of the tissues is the most noticeable feature. Weight, 3 lbs. 3 oz.

Thorax and Abdomen.—The voluntary muscles exposed in the preliminary incision are of a rich dark red color. Intestines and omentum pale and bloodless; position of abdominal viscera normal. In the thorax the right pleura contains a pint of reddish serum, the left half a pint, in which a few floculi of lymph are seen. There are pigmentary (?) deposits upon parietal layer over diaphragm and bodies of the vertebrae.

Pericardium is normal, a few ecchymoses on visceral layer over left ventricle. *Heart*, very flaccid, walls of chambers collapsed. A good deal of sub-pericardial fat, especially over right cavities. Ventræ cavæ nearly empty. Right auricle contains 3 iss. of blood, light claret coloured, and one small conculum, partly decolourized. Right ventricle contains a very small amount of blood; walls thin; endocardium stained. Valves healthy. Mus. papill. pale yellow colour. Left auricle empty. Left ventricle contains very little blood; lining membrane stained. Walls of normal thickness, muscle soft, somewhat paler than normal. Valves healthy. Aorta of normal diameter. *Lungs*; pigmentation moderate; slight congestion (post-mortem) in dependent parts, and also an excess of serosity. Structure healthy.

Spleen, slightly enlarged, weighs 3 z. Numerous adhesions, infiltrated with serum, bind it to the diaphragm, stomach, and colon. On section pulp very soft, dark red in colour, almost diffuent. *Left kidney* ($5\frac{1}{2}$ inches long). Section shows a pale, coarse organ, somewhat softer than natural. *Left supra-renal capsule* pale, soft in the centre. *Right kidney*, moderately congested in the cortical portion and at bases of pyramids. Cones very pale. *Right capsule* healthy. Bladder healthy. Vesiculæ seminales contain spermatozoa. *Stomach* distended with gas; contains about 4 oz. of a brownish viscid fluid. Numerous ecchymoses along the greater curvature, especially at the cardiac end. The veins contain blood. Mucous membrane looks normal.

Duodenum and jejunum healthy. Coats of the *ileum* very thin, translucent, and anæmic. The solitary glands prominent in the upper part; only one patch of Peyer found in the lower portion. Large bowel normal.

Mesenteric glands appear even smaller than natural.

Pancreas healthy. *Liver*, a few ecchymoses on capsule, a small cicatrix on upper surface of right lobe. Substance pale, in parts much softened. Weight, 3 lbs. 8 oz. Gall bladder contains normal-looking bile.

HISTOLOGICAL EXAMINATION.

The blood examined during life was very thin, watery, and of pale claret colour. It presented the following characteristics:—Colourless corpuscles appear perfectly natural in structure and size, and are not numerically increased. No large granular ones, such as described by Litten,¹ could be found. Two forms of coloured corpuscles: (a) ordinary forms, which are paler than natural, flattened out, less biconcave, and are very irregular in outline, some ovoid, others with sinuous borders, others again with pointed processes. (b) Small red corpuscles—microcytes,—erroneously described by Eichorst as pathognomonic of this affection. They were numerous, 8 to 10 occurring in the field of No. 9 im. and oc. 3. The diameter ranged from 1-5000" to 1-9000." They equalled, or even exceeded, in colouration the ordinary forms; some were crenated, and they frequently presented a pit or cup-like depression on one side. In the repeated examinations of the blood, extending over three months, these forms increased but little numerically.

Schultze's granular masses were not noticed. No appreciable difference could be detected in the histological appearance of the blood an hour after the transfusion.

The heart presented signs of moderately advanced fatty degeneration, the striæ in many fibres being obscured by molecular fat and droplets of oil.

Spleen.—The normal elements, cells of the spleen pulp, and spindle-shaped corpuscles of the trabecula, together with numerous blood corpuscles, were the only structures noticeable in teased preparations.

Kidneys.—In both cortical and pyramidal portions the cells of the tubules appear very granular, somewhat swollen, and a large number of oil droplets are seen in and about the tubules.

Liver.—The cells contain oil drops in excess, and in many the nuclei are obscured. There is also some fatty infiltration.

The marrow of all the bones examined, sternum, ribs, vertebrae, radius, fibula, was of a violet-red colour, of good consistence, and,

¹ Berliner Klinische Wochenschrift, No. 19, 1877.

with the exception of that of the fibula, contained no fat. There were found the ordinary large, coarsely granular, marrow cells, numerous small lymphoid corpuscles, and red blood corpuscles of both sizes; and, in addition, very many nucleated red blood corpuscles, corresponding with those described by various writers as occurring in the marrow in cases of leukæmia, and by Cohnheim¹ and myself² as constituents of this tissue in certain cases of pernicious anæmia. They were most abundant in the marrow of the sternum, fewest in that of the vertebræ. They were considerably larger than the ordinary red blood corpuscles and of about the same intensity of colouration. The majority had only one nucleus, but cells with two, three, and four were not uncommon. The position of the nucleus was usually eccentric, often, indeed, protruding half way from the corpuscle. The nuclei were colourless.

The disease which Addison was the first to recognize and describe as Idiopathic Anæmia has within the past five years excited an unusual degree of interest, owing, in great part, to the publication in 1872, by Biermer, of Zurich, of a series of observations upon a form of anæmia which he regarded as a new disease, and to which he gave, as marking the chief characters of the affection, the name "Progressive Pernicious Anæmia." Lebert had previously, about the same time as Addison, under the term "Essential Anæmia," described similar cases. Though, no doubt, long before Addison wrote, instances of this disease had been from time to time observed, still to him is due the credit of having given the first accurate clinical picture of the affection in his own inimitable way. Judge from the following quotation, which is given purposely, as his name has not received full justice in connection with this affection. He says: "For a long period I had from time to time met with a very remarkable form of anæmia, occurring without any discoverable cause whatever—cases in which there had been no previous loss of blood, no chlorosis, no purpura, no renal, splenic, miasmatic, glandular, strumous or malignant disease. Accordingly, in speaking of this form in clinical lecture, I, perhaps with little propriety, applied to it the term 'idiopathic,' to distinguish it from cases in which there existed more or less evidence of some of the usual causes or concomitants of the anæmic state. The disease presented in every instance the same

¹ Virchow's Archiv. Bd. lxxviii.

² Centralblatt für die Med. Wissenschaften, Nos. 15 and 28, 1877.

general characters, pursued a similar course, and, with scarcely a single exception, was followed after a variable period by the same fatal result. It occurs in both sexes generally, but not exclusively, beyond the middle period of life, and, so far as I at present know, chiefly in persons of a large and bulky frame and with a strongly marked tendency to the formation of fat. It makes its approach in so slow and insidious a manner that the patient can hardly fix a date to his earliest feeling of that languor which is to become so extreme. The countenance gets pale, the whites of the eyes pearly, the general frame flabby rather than wasted, the pulse, perhaps large, but remarkably soft and compressible.....there is increasing indisposition to exertion, with an uncomfortable feeling of faintness or breathlessness on attempting it; the heart is readily made to palpitate; the whole surface of the body presents a blanched, smooth, and waxy appearance; the lips, gums and tongue seem bloodless; the flabbiness of the solids increases; the appetite fails; extreme languor and faintness supervene, breathlessness and palpitation being produced by the most trifling exertion or emotion; some slight œdema is probably perceived about the ankles; the debility becomes extreme. The patient can no longer rise from his bed, the mind occasionally wanders, he falls into a half torpid state, and at length expires." With this classical picture the case here reported corresponds in every particular, the characteristic feature being the profound anæmia, shown by the pallor of the skin and mucous membranes, and the various functional symptoms of this condition, hæmic murmurs, etc.; no emaciation; progressive increase of all these symptoms in spite of medicaments which are effective in the ordinary anæmias, and, lastly, the absence, post-mortem, of any changes to account for the affection, bloodlessness and fatty degeneration of the organs being the only recognizable alterations.

Our knowledge of the etiology of the disease cannot be said to have advanced materially since Addison wrote. The very general fatty degeneration of the internal organs, by far the most constant and marked lesion, is to be regarded as a secondary change. The coarse and histological changes in the spleen and lymphatic glands, where, if anywhere, we should naturally expect to find alterations giving some clue to the failure in blood-making function, are not constant, sometimes they have been found slightly enlarged, at others atrophied. Indeed, so far as these organs are concerned, the numerous and careful observations

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of the past five years have failed to discover any definite lesion in them which would account for the symptoms, or in any way connect derangement of their function with the production of the disease. In one direction, however, there has been some progress, and to this we shall briefly allude. Clinically the cases present certain similarities to those of leukæmia and Hodgkin's disease, or pseudo-leukæmia. Now these latter diseases differ chiefly in this, viz., that in leukæmia the colourless blood corpuscles are in excess; in pseudo-leukæmia they are not. Both present three varieties: 1st the splenic, in which the chief lesion is the great enlargement of the spleen; 2nd, the lymphatic, in which the lymph glands throughout the body are mainly affected; and, 3rd, the researches of Neumann, Mosler, and others have made us acquainted with a variety known as the myelogenous or medullary, in which the marrow of the bones is the seat of disease. This tissue is now generally regarded as sharing, in the young animal at any rate, with the spleen and lymph glands in the formation of blood corpuscles. In the long bones of the adult it is in a state of atrophy, and its place, in great part, supplied by fat. In many cases of leukæmia and pseudo-leukæmia, it increases, becomes more vascular, its cellular elements multiply, nucleated red blood corpuscles, such as occur in the embryo, are formed, and the whole tissue passes into a condition of hyperplasia, strictly analogous to that affecting the spleen and lymphatic glands. This may be, as in a case recently reported by Mosler,¹ the primary lesion in leukæmia, and the development of the marrow may produce definite symptoms, such as swelling and tenderness of certain parts of the bones; so that the myelogenous forms of these affections are now well recognized. Clinically the myelogenous form of pseudo-leukæmia, though rarely uncomplicated, presents such a similarity to pernicious anæmia that Jaccoud,² and Immerman³ suggested the identity of the two affections, while Prof. Pepper,⁴ declared distinctly that pernicious anæmia was "merely the simple medullary form of pseudo-leukæmia."

As I have quite recently, in commenting upon another case,⁵ referred fully to the facts for and against this view, I need not

1 Berliner Klinische Wochenschrift, Nos. 50, 51, 52, 1876. 2 Nouv. Dict. de Méd. et de Chirurg. Leucocythémie. 3 Ziemssen's Handbuch der Speciellen Pathologie und Therapie, Bd. xiii. Art. Pro. Pernic. Anæmia. 4 American Journal of Medical Sciences, Oct., 1875. 5 Canada Medical and Surgical Journal, March, 1877.

recapitulate them here. In the present state of our knowledge it may, I think, be reasonably affirmed that certain cases of idiopathic anæmia may be placed in the category of myelogenous affections, and among them the one here reported. To many it may appear far-fetched to seek in the altered condition of the bone marrow an explanation of the extreme anæmia of this disease, but the reports of numerous cases leave no room for doubt that a serious alteration in its structure, and a return in adult life to its embryonic state, may profoundly influence the composition of the blood, producing anæmia and death. It must be borne in mind that the red marrow in the short bones of an adult probably equals in bulk the constituents of the spleen, and structurally is very similar to that organ and to the lymphatic glands. In the long bones it is largely replaced by fat, but traces of it still remain. Now, granting that the marrow is a tissue which shares in the blood-making functions, it is quite as reasonable to suppose that, if hyperplasia of the elements of the spleen can lead to serious disturbance in the composition of the blood, producing the splenic form of leukaemia or pseudo-leukaemia, according as the colourless corpuscles of the blood are increased or not, so a general increase of the constituents of the marrow may induce similar conditions. For it is to be remembered that, in a general hyperplasia of the marrow, the actual amount of lymphoid tissue in the osseous system equals or perhaps exceeds that of an enlarged spleen. Why a simple hyperplasia of this tissue should interfere with the elaboration of the blood, altering in the one case the mutual proportion of the corpuscles, and in the other simply reducing the total number, we do not know, but we are just as ignorant why an enlarged spleen and lymphatic glands should produce in the one case leukaemia and in the other not.

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Von Dr.

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Beschaffenheit des Blutes und Knochenmarkes bei perniciöser Anämie.

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Von Dr. Osler, Professor an der McGill Universität in Montreal (Canada).

Ein zweiter Fall von perniciöser Anämie hat mir von Neuem Gelegenheit gegeben das Blut und Knochenmark genau zu untersuchen und die Angaben von COHNHEIM und von mir über die Beschaffenheit des letzteren zu bestätigen.

Der Patient, ein 54jähriger Engländer, zeigte die ausgesprochenen Symptome jener Krankheit und starb 2 Tage, nachdem eine Transfusion gemacht worden war. Die Leichenschau ergab nur allgemeine Anämie und starke Fettentartung. Das bei Lebzeiten untersuchte Blut war dünn und wässrig und zeigte keine Vermehrung der weissen Körperchen. Die gewöhnlichen rothen Körperchen waren blass, platt und unregelmässig gestaltet. Die bei dieser Krankheit so gewöhnlichen Microcyten waren sehr zahlreich, oft 10—12 in einem Gesichtsfeld von HARTNACK 9 imm. und 3. Sie waren rund, zeigten aber oft eine Delle. Kernhaltige rothe Körperchen wurden trotz längeren Suchens nicht gefunden, ebenso wenig grosse farblose, den Markzellen ähnliche Elemente, wie sie LITTEN als im Blute vorkommend beschreibt (Berl. klin. Wochenschr. 1877. No. 20).

Das Mark aller darauf untersuchten Knochen (Brustbein, Rippen, Wirbel, Fibula, Radius) war dunkel violetroth und enthielt mit Ausnahme desjenigen der Fibula kein Fett. Es fanden sich in ihm die gewöhnlichen Markzellen, sowohl die grossen grobkörnigen, wie die kleinen lymphoiden, ferner rothe Blutkörperchen, darunter sehr viele kleine, jedoch nicht zahlreicher als im Blute, endlich kernhaltige rothe Körperchen, in jeder Hinsicht den früher von mir beschriebenen (Cbl. 1877, 258) gleichend. Sie fanden sich sehr zahlreich namentlich im Brustbein, am wenigsten in dem Wirbelmark, waren beträchtlich grösser als die gewöhnlichen rothen Zellen und von gleich starker Färbung. Die meisten hatten einen Kern, doch waren solche mit 2, 3, selbst 4 Kernen nicht ungewöhnlich. Die Kerne lagen in der Regel excentrisch, oft freilich halbwegs aus der Zelle herausgetreten. Auch in diesem Falle erschienen sie ungefärbt. —

Ueber

Von Dr. Osle

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Ueber die Beschaffenheit des Blutes und Knochenmarkes in der progressiven perniciosen Anämie.

Von Dr. Osler und Dr. Gardner, Professoren an McGill University in Montreal (Canada).

Der Fall betraf einen 52jähr. Engländer mit allen Zeichen der oben genannten und weit vorgeschrittenen Krankheit, ausgenommen Haut- und Netzhautblutungen. Das während des Lebens untersuchte Blut zeigte Folgendes: Die meisten rothen Körperchen erscheinen gross, aber ohne den gewöhnlichen kreisförmigen Contur; viele sind oval, andere von verschiedener Gestalt mit unregelmässigen Ausläufern und Fortsätzen. Sie sind blass und platt und viele zeigen auch, wenn man sie rollen lässt, nicht die biconcave Form. Im jedem Gesichtsfeld (HARTNACK's Imm. 9, Oc. 3) sieht man die kleinen runden von EICHHORST (Cbl. 1876, 465) beschriebenen Körperchen, zuweilen bis 6 oder 8. In 40 aufs Gerathewohl unternommenen Messungen waren (mit HARTNACK's Imm. 16.) die äussersten Maasse 0,00363 und 0,01181 Mm. Kernhaltige rothe Körperchen wurden auch bei langem Suchen vermisst. Die weissen Körperchen zeigten keine Abnormität und schienen auch nicht vermehrt zu sein. M. SCHULTZE's Zerfallskörnchen fehlen gänzlich.

Die Leichenschau ergab beträchtliche Verfettung des Herzens, der Nieren und der Leber, die Milz war eher etwas kleiner, als normal und wog nur 170 Grm., die Lymphdrüsen nirgends vergrössert, im Mesenterium sogar sehr klein. Das Knochenmark (von Sternum, Rippen, Clavicula, Fibula, Wirbel) hat eine dunkle violet-rothe Farbe, ist dick, etwa von der Consistenz des Milzparenchyms im Fieber. Es enthält: 1) farblose Körperchen (Markzellen) verschiedener Gestalt mit körnigem Protoplasma und deutlichem bläschenförmigem Kern. Die meisten sind grösser, als die weissen Blutzellen und haben gewöhnlich nur einen Kern. Ausserdem finden sich zahlreiche kleine runde, den Lymphkörperchen gleichende Elemente. 2) Rothe Blutkörperchen in zwei Arten: a) gewöhnliche biconcave, etwas unregelmässig gestaltete Scheiben und häufig, wie auch während des Lebens beobachtet, mit langen Fortsätzen. Diese bilden den grösseren Theil. b) Kleine runde, nicht kernhaltige Körperchen, etwa $\frac{1}{4}$ — $\frac{1}{2}$ so gross, als die gewöhnlichen, ähnlich den im Blute gesehenen. Sie sind sehr zahlreich in der Fibula, wo sie gut $\frac{1}{4}$ der gefärbten Elemente ausmachen. 3) Kernhaltige rothe Körperchen (NEUMANN's Uebergangsformen) sind zahlreich im Sternum und der Rippe, in den anderen genannten Knochen sind sie sehr sparsam oder wegen der Blässe der rothen Körperchen hier schwieriger zu sehen. Meistens sind sie

grösser, als die gewöhnlichen rothen Körperchen, zeigen aber, wie diese ein ganz gleichmässig gefärbtes Stroma mit einem feingranulirten Kern. Sie stellen runde, nicht biconcave Scheiben dar, oft mit unregelmässigen Umrissen, oder mit einem spitzen Ausläufer. Ihre Färbung ist meist eben so stark, wie die der gewöhnlichen rothen, zuweilen stärker, oder schwächer. Die Kerne sind rund oder elliptisch und nehmen $\frac{1}{4}$ — $\frac{1}{2}$ des Zellkörpers ein, sie sind solid, gekörnt und erscheinen in den Zellen gefärbt. Ein Kernkörperchen konnte nicht wahrgenommen werden. Die Lage des Kerns in den Zellen war verschieden, bald nach dem Tode erschien er central gelagert. In den am folgenden Tage untersuchten Proben dagegen lagen viele Kerne peripherisch und andere waren aus den Zellen ausgetreten und erschienen nun ganz ungefärbt. In 3 oder 4 Proben wurden Kerne von Dumbbell-Form gesehen. Zellen mit 2 Kernen waren nicht selten und auch solche mit 3 oder 4 Kernen wurden beobachtet. In 15 Messungen ergaben 11 einen Durchmesser dieser Zellen von über 0,01250 Mm. Im Folgenden geben wir die Messungen von 3 Zellen mit ihrem Kern: 1) 0,01409 : 0,01136; Kern: 0,00954 : 0,00863 Mm. 2) 0,01136 : 0,01045; Kern: 0,00454 : 0,00500 Mm. 3) 0,01227 : 0,01272; Kern: 0,00682 : 0,00772. Es erhellt hieraus die Unregelmässigkeit der Form dieser Körperchen und die annähernde elliptische Gestalt der Kerne. 4) Blutkörperhaltige Zellen, sehr reichlich im Wirbelmark wo 3—4 in einem Gesichtsfeld erscheinen und 5—6 rothe Körperchen mit deutlich erhaltener Farbe und Gestalt enthalten. Im Sternum und Rippe sind sie viel spärlicher, in der Fibula und Clavicula gar nicht zu sehen. 5) Von Myeloplaxen wurden 1—2 im Sternum- und Rippenmark gefunden. 6) Fettzellen im Clavicularmark in geringer Zahl, im Sternum-, Wirbel- und Rippenmark gar nicht zu finden. 7) CHARCOT'sche octaëdrische Krystalle waren überall im Mark 12—30 Stunden nach dem Tode zu finden.

Der beschriebene Befund gleicht ziemlich dem von COHNHEIM*) beschriebenen. Auch PEPPER**) und SCHEBY-BUCH***) erwähnen Hyperplasie des Marks bei perniciöser Anämie, so dass es wahrscheinlich ist, dass gewisse Fälle dieser Krankheit zur myelogenen Form von Pseudoleukämie zu rechnen sind.

*) Virchow's Arch. LXVIII. 2.

**) Amer. Journ. of med. sc. 1875. Octbr.

***) Deutsches Arch. f. klin. Med. 1876. April.

OVER-STRAIN OF THE HEART.

AS ILLUSTRATED BY A CASE OF

HYPERTROPHY, DILATATION AND FATTY DEGENERATION OF THE HEART, CONSEQUENT UPON PROLONGED MUSCULAR EXERTION.

—BY—

WILLIAM OSLER, M.D.,

PROFESSOR OF THE INSTITUTES OF MEDICINE, MCGILL UNIVERSITY, MONTREAL.

—OF—

(From the *Canada Medical and Surgical Journal*, March, 1878.)

Montreal:

PRINTED AT THE "GAZETTE" PRINTING HOUSE

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(From Canada Medical and Surgical Journal, March, 1878.)

CASE OF HYPERTROPHY, DILATATION AND FATTY DEGENERATION OF THE HEART, CONSEQUENT UPON PROLONGED MUSCULAR EXERTION.

Do fatal and uncomplicated cases of hypertrophy and dilatation of the heart ever occur as consequences of severe and prolonged muscular exertion?

The following case is offered as a contribution to this question, upon which there is as yet a considerable diversity of opinion among Pathologists.

On Nov. 7th, 1876, I performed an autopsy on a large, powerfully-built, muscular man, who had died with all the symptoms of chronic valvular disease, and in whom great dilatation and hypertrophy of the heart were found, but without presenting any of the conditions commonly recognized as productive of these states,—no valvular affection, no arterial degeneration, no emphysema or other chronic pulmonary disorder, no renal disease; there was, in fact, an entire absence of the lesions usually met with in cases of this kind.

I am indebted to my colleague Dr. Ross for permission to use

the following clinical notes, taken by Dr. James Bell, at that time the ward clerk :

J. W., *æt.* 39, an Englishman, was admitted into the Montreal General Hospital, Nov. 2nd, 1876. He is a large, powerfully-built man, with tremendous chest girth. He had been a soldier for 18 years, serving in the different British stations, and latterly has followed the occupation of a blacksmith. Has never had syphilis, or rheumatic fever. Has always been a healthy man, though intemperate. In July last he suffered from shortness of breath and slight hæmoptysis, for which, in August, he entered the hospital, and was under treatment nearly two months for "some heart affection," being discharged very much improved. He then worked for three weeks as a day labourer and suffered much from exposure to cold and wet. On October 20th he had a chill, which was followed by swelling of the legs and abdomen, with slight dyspnœa. He gave up work on the 24th, and was treated as an out-door patient for a few days before entering Hospital on November 2nd. When admitted, in addition to the above-mentioned symptoms he complained of great pain over the region of the heart. The legs were œdematous, and the conjunctivæ and face of a sub-icteroid hue. On physical examination, the cardiac dulness was found to extend as high as the upper border of the third rib, and to the right border of the sternum. A systolic murmur was heard at the left edge of the sternum in the third interspace. Apex beat could not be distinctly felt. The pulse at the wrist was barely perceptible. There was dulness over the lower lobe of the left lung. Rough snoring râles were heard over the front of the chest and coarse bubbling râles behind. Liver dulness extended from the 5th interspace to the costal margin. The urine contained nearly 25 p. c. of albumen. The day after admission he expectorated nearly three pints of florid blood and vomited very frequently. In spite of treatment (dry cupping, ergot, digitalis, etc.,) his condition became worse. On November 5th the pulse was quite imperceptible at the wrist, the cyanosis became extreme, and the patient died early on the morning of the 5th, with all the symptoms of chronic valvular disease.

Post-mortem, 30 hours after death. Face, neck, and skin of thorax intensely livid. Tissues beneath the skin of anterior part of trunk and about the root of the neck emphysematous. Scrotum much swollen. Legs œdematous.

Brain.—Sinuses of dura mater and veins of the pia mater full. Arteries at the base not diseased. Nothing abnormal in the brain substance.

Heart weighs 610 grms. ($21\frac{1}{2}$ oz.) Right chambers distended with dark clots and fluid blood; the venæ cavæ are also dilated and full, much blood escaping from them in the removal of the organ. Right auricle is very large, size of a small orange; walls of about the usual thickness. Right ventricle dilated, anterior wall measures $\frac{1}{4}$ " in thickness; columnæ carneæ are not hypertrophied. Tricuspid orifice $5\frac{7}{8}$ " in circumference: valves healthy. Pulmonary valves normal; circumference of orifice 3". Left ventricle contains some fluid blood, and a small partially decolourized clot in the mitral orifice. The chamber is much dilated, measuring $4\frac{1}{2}$ " from apex to aortic ring, and bulges considerably towards the right ventricle. Endocardium thick and opaque, especially over the septum. Museuli papillares fibroid at apices; walls over middle of anterior part $\frac{7}{8}$ " in thickness; posterior wall $\frac{1}{2}$ "; ventricular septum, a quarter of an inch below aortic valve, $\frac{1}{2}$ ". Mitral valves slightly thickened at the edges, otherwise healthy. Orifice measures $4\frac{1}{4}$ " in circumference. Aortic valves competent, segments thin and natural-looking; orifice at the ring measures $2\frac{3}{4}$ " in circumference. Aorta looks—relatively—smaller than natural. It is not atheromatous, either in the arch or in its course. Muscular substance of whole heart, and especially the left ventricle, looks pale, and on examination is found to be in a condition of advanced fatty degeneration; much fatty infiltration also exists between the individual fibres.

Arteries of the body present no signs of degeneration.

Lungs. $\frac{3}{4}$ xvi of serum in left pleura, the lung on this side is collapsed and only slightly crepitant above. Two very large spots of apoplexy in the anterior part of upper lobe, and

about them the lung tissue is hepatized. Another, also large, occupies the anterior border of the lower lobe. Right lung is crepitant, but contains much blood and serum. At the lower and front part of anterior lobe is a small, consolidated area.

Spleen, 250 grms., firm.

Kidneys, not enlarged. Capsules detach easily; surfaces smooth. On section pyramids and Malpighian tufts of the cortex are injected.

Stomach and intestines present nothing unusual; the large and small veins are very full.

Liver, a little enlarged, of good consistence; venules of hepatic vein gorged—nutmeg organ.

The degree of hypertrophy and dilatation will be seen at a glance in the following table:

HEART OF J. W.		(PEACOCK.)	(BIZOT.)
		Normal Heart.	Normal Heart.
Right ventricle, ant. wall....	3"	1.85"	
Left " " " " ...	.87"	.53"	0.43"
" " post. wall..	.5"		
" " length.....	4.5"	3.33	2.61
Mitral orifice, circumference	4.25"	3.58	4.29
Aortic " "	2.75"	3.17	2.74
Tricuspid " "	5.87"	4.50	4.81
Pulmonary orifice " - -	3.3"	3.33	2.79
Weight of Heart - - - -	21.5 oz.	9.75 oz.	

The dilatation of the left ventricle is very marked, while the hypertrophy of the walls is moderate. Judged by Peacock's standard, the mitral orifice is somewhat dilated while the aortic ring is even smaller than natural, though by Bizot's standard it is just normal. It certainly appeared very much out of proportion to the huge left ventricle. The tricuspid orifice is very large, and the right chamber considerably dilated, while the opening of the pulmonary artery is about normal.

The hypertrophy and dilatation in themselves presented nothing remarkable, and the other lesions were those of everyday occurrence in organic heart disease—hydro-thorax, œdema and hæmorrhagic infarction of the lungs, venous congestion of

the liver, spleen and kidneys; the fatal result depending on the condition of the lungs. But what could account for the hypertrophy and dilatation? This was the difficulty, and so impressed was I at the time with the unusual character of the lesion that a most searching examination of the different organs was made and careful measurements of the heart were taken, but no satisfactory cause could be found for the cardiac affection, so that the notes were laid aside and the case labelled 'idiopathic.'

A few months after, in Nos. 17 and 18 of the *Berliner Klinische Wochenschrift*, 1877, there appeared a paper by Dr. Zunker, one of Professor Leyden's Assistants at the Charité, Berlin, on a case of "Dilatation and Fatty Degeneration of the Heart, in consequence of over exertion," which, in its clinical features and anatomical characters is almost the exact counterpart of the one under consideration, except that the dilatation was a little more marked and the hypertrophy not so great. This gave a possible clue to the interpretation of the case, and I immediately made enquiries about the past life of the man, but was not very successful, as his wife had left the city, and from her alone could definite information have been obtained. It was, however, ascertained, that after leaving the army he had worked as a blacksmith, and subsequently as a corporation labourer. He was, as I have said, powerfully built and very muscular, an acquaintance describing him as a "perfect picture of a man." From the facts I have gathered, and the similarity of the case to several which have been recorded, I am inclined to regard the condition of the heart as intimately associated with and dependent upon the over use of a highly developed muscular system.

Before dealing with the question of how the abnormal state was brought about, it may be well to make a few preliminary remarks on the influence of prolonged and severe muscular effort on the circulatory system.

In the works of one or two of the older writers upon the heart very definite statements are met with bearing on this question: Thus—

Corvisart,* among other causes of heart disease, mentions muscular exertion, and records a fatal case of hypertrophy without valvular disease following violent exertion.

Hope† states that "occupations requiring constantly renewed muscular efforts," produce in time dilatation of the heart.

Latham‡ was, I believe, the first to recognize fully the importance of over exertion in the causation of heart affections, and under the term "shock of the heart," describes cases of rupture of valves, and of hypertrophy, following sudden and severe muscular efforts.

The attention of army surgeons was early called to the prevalence of heart disease among soldiers, and in the great majority of these without any history of acute rheumatism.

McLean§ brought the subject prominently before the authorities and the profession, believing the evils to result largely from the constricting influence of the regulation pack and other accoutrements upon the chest.

Peacock,|| about the same time, in his lectures on valvular diseases, showed how liable the valves were to injury from violent muscular efforts.

During the American civil war the injurious effect of military life upon the heart was abundantly proved, and the rich clinical material then afforded enabled several observers¶ materially to advance our knowledge in this direction.

In 1870 an important monograph by Myers** appeared,

* Treatise on the Diseases and Organic Lesions of the Heart, translated by Hobb, London, 1813. pp. 28, 63.

† A Treatise on Diseases of the Heart, 2nd edition, London, 1855.

‡ Lectures on Diseases of the Heart, London, 1846.

§ Lecture at Royal United Service Institution, 1865.—Brit. Medical Journal, 1867.

|| Valvular Diseases of the Heart, London, 1865.

¶ Da Costa: Observations upon Heart Disease in Soldiers. Medical Memoirs of the United States' Sanitary Commission, 1867.

Taylor: Remarks on Heart Disease.—Transactions of American Medical Association, vol. 18, 1867.

Da Costa: On Irritable Heart.—"Am. Journal Med. Sciences," Jan. 1871.

Treadwell: On Over-work and Strain of the Heart.—"Boston Medical and Surgical Journal," 1872.

** Diseases of the Heart among Soldiers, London, 1870.

and since that date important articles have been written by Albutt,* Seitz,† Thurn,‡ Fränkel,§ and Levy,|| illustrating in various ways the effects of over-work and strain on the heart.

The recent works on the heart¶ deal either not at all or very cursorily with the subject.

The above constitutes the chief literature of the subject, and from an analysis of the papers the following conclusions may be drawn with regard to the effect of overwork on the heart.

1. Sudden and violent exertion may cause rupture or laceration of the valves—a very serious lesion, which often proves fatal within a short time.

2. The augmented resistance to the flow of blood during severe and prolonged muscular exertion increases the work of the heart, which, in response to the demand made upon it, enlarges. The blood pressure in the aorta, abnormally high even during the diastole, is much increased during the systole of the powerful left ventricle, and the coats of the vessel yield, commonly at the arch, becoming pouched and atheromatous. Incompetency follows, either from stretching of the aortic orifice or giving way of the valves.—(Albutt.)

3. In the functional disorder of the heart described by Da Costa, Myers, and others, as common in young soldiers, and termed by the former, 'irritable heart,' there is hypertrophy of the muscular walls of the organ, caused by over-work at drill and the constricting effects of the military accoutrements. This may in time be followed by valvular disease.

4. It appears from a number of recorded cases that overwork

* Over-work and Strain of the Heart. — St. George's Hospital Reports. Vol. 5, 1872.

† Zur Lehre von der Ueberanstrengung des Herzens. — Deutsches Archiv. für Klinische Medizin, 1872.

‡ Ermüdung des Herzens und die Entstehung von Herzfehlern. Republished by Seitz, together with the articles of Albutt, Da Costa, and Myers, as a separate volume.

§ Virchow's Archiv. Bd. 57.

|| Du Cœur forcé ou de l'asystole sans lésions valvulaires. Thèse inaugurale, Nancy, 1875. Resume in Archives Générales, Janvier, 1876.

¶ Ziemssen's Encyclopedia of Practical Medicine.

Balfour—Diseases of the Heart, 1875.

Hayden—Diseases of the Heart and Aorta, 1875.

Reynold's System of Medicine, vol. 4. 1877.

of the muscles may induce a primary dilatation and hypertrophy of the heart, which, without valve affection or arterial degeneration may prove fatal, with all the symptoms of chronic cardiac disease.

It is this last condition to which I wish specially to direct attention, as I believe the case reported affords an illustration of it.

Very few of the writers mentioned above, though dealing specially with the effects of over exertion on the heart, appear to be aware of the possibility of a fatal result as an immediate sequence of primary hypertrophy and dilatation.

Peacock* records three cases in which after death no affection of the valves or orifices was found, but simply hypertrophy and dilatation, and explains these conditions by supposing "that from the enlargement of the left ventricle which existed in all the cases the mitral valves had not been properly adjusted during the systole." He offers no explanation as to the cause of the enlargement of the heart, but passes on immediately after to the state of the organ in the Cornish miners, which he refers directly to the severe muscular effort necessary in their work and in climbing long ladders up and down the shafts.

Seitz† gives a remarkable series of cases observed in Biermer's Clinic in Zurich, almost all of which presented the following symptoms: "Palpitations, and ill-defined sensations in the cardiac region as if the heart were about to stop, shortness of breath, anxiety, feeling of faintness, cyanosis, anasarca, enlargement of the liver, irregularity and intermittent action of the pulse, dilatation of the heart, apex beat feeble and dislocated downwards and outwards, increase in cardiac dulness. Heart sounds sometimes normal, but not unfrequently murmurs at the apex." Post-mortem, the anatomical changes were confined to "Hypertrophy of the walls and dilatation of the chambers, valves unaffected; degeneration of a few muscle fibres; rarely fatty." He regards over work as the most important factor in the production of these cases.

In the case reported by Dr. Zunker from Leyden's Clinic, the

* Loc. cit.

† Loc. cit. p. 61.

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connection between the over-exertion and the heart disease is very well brought out. The patient, a journeyman mason, had enjoyed good health up to six weeks before his admission. During this time he had been engaged in the unusually severe work of carrying heavy stones up long ladders. He stood this very well for three weeks, when he began to suffer from want of breath and a slight cough. Soon palpitations came on, the shortness of breath increased, the legs began to swell, and he was forced to take to his bed. He got rapidly worse and was sent to the Charité cyanotic and almost moribund. Hydrothorax of the right side was detected, the chest was tapped, and 128 cc. of clear fluid were drawn off with great relief; but the attacks of dyspnœa recurred, and he died four days after admission with all the symptoms of chronic heart disease. At the autopsy the heart was found enormously dilated, the walls in a condition of fatty degeneration; no valvular disease, no chronic renal or pulmonary affection.

In the case of J. W., the evidence of prolonged muscular effort is presumptive rather than direct. The occupations which the man had followed guaranteed a tolerably active exercise of his voluntary muscles, and it has been from among soldiers and smiths that a very large proportion of these heart cases have been described. Moreover, the high development of his muscular system afforded the best possible proof of its constant use. There must have been some agency at work to produce the dilatation and hypertrophy, and considering the above facts, and in the absence of all the recognized causes, I feel more inclined to regard it as due to overwork than to look upon it as spontaneous or idiopathic.

But how, it may be asked, is all this brought about? Severe muscular exertion affects the circulation in two ways: first, by interfering with respiration and the free passage of blood through the lungs; the right heart gets over-loaded, the systemic veins full, and thus an obstacle is offered to the outflow of blood from the arteries; in consequence of which the left ventricle becomes dilated and must hypertrophy to overcome the increased resistance to the arterial flow. According to Peacock, the large

hearts of the Cornish miners are produced in this way. In the June number of Von Ziemssen's Archiv, there is an interesting article on "Das Tubinger Herz," by Dr. Münzinger, descriptive of a form of heart disease similar in some respects to the one under consideration. It is met with among the vine dressers who undergo very severe work in carrying manure in baskets on their backs long distances up the mountains. The exertion required is very great, and the respiration is considerably interfered with by the constricting pressure of shoulder straps. Sooner or later they suffer from dilatation and hypertrophy; but as this has always been found associated, post-mortem, with emphysema, it is difficult to say in these cases how much is due to this condition and how much to the muscular effort itself.

Secondly, the effect of over exertion may act in a much more direct manner. The experiments of Traube upon dogs have shown that during extensive muscular contraction the blood pressure in the arteries is greatly increased, and the same may reasonably be inferred of men. The more laborious the work, and the more violent the contraction of the muscles, so much the greater difficulty has the blood in flowing through the systemic arteries. The arterial pressure is increased and the blood tends to accumulate in the aorta and the left ventricle. If the nutrition be maintained no ill effect will follow from this, for the left ventricle hypertrophies and the balance is restored. That this state does exist is a well attested fact, and Albutt speaking of this early condition of hypertrophy says "that he has found in a few autopsies of such men killed by accident or acute disease, that the ventricles, the left especially, are, like their bicipites, large and red," the heart weighing as much as 16 oz.

The lower animals furnish good examples of hypertrophy following severe exercise. Houghton* states that the heart of the celebrated greyhound, 'Master Magrath,' weighed 9.57 oz., just three-fold in excess of the normal proportion of heart-weight to body-weight, and no other cause could be assigned for the great enlargement than the prolonged muscular effort in coursing.

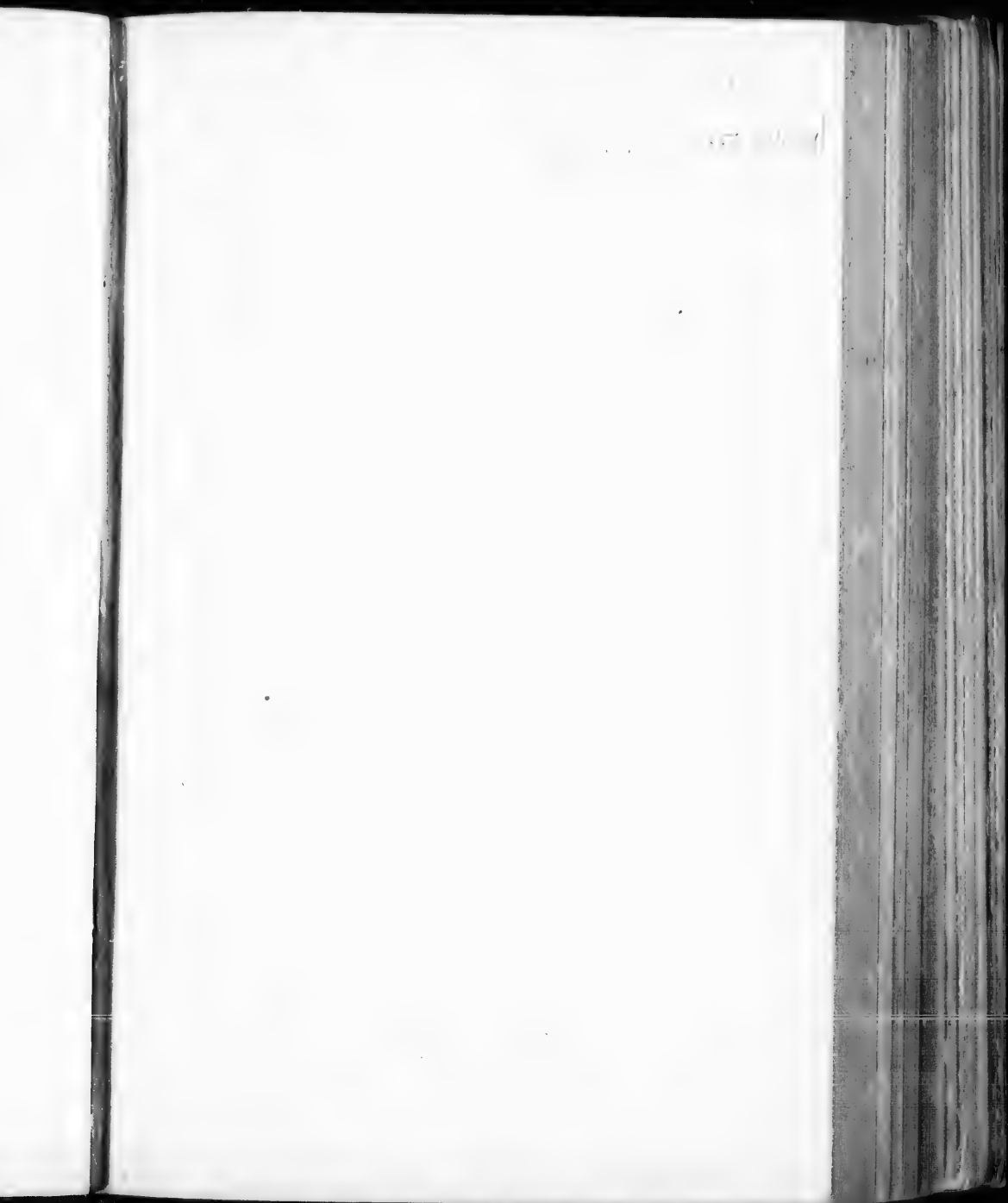
* "British Med Journal," 1872..

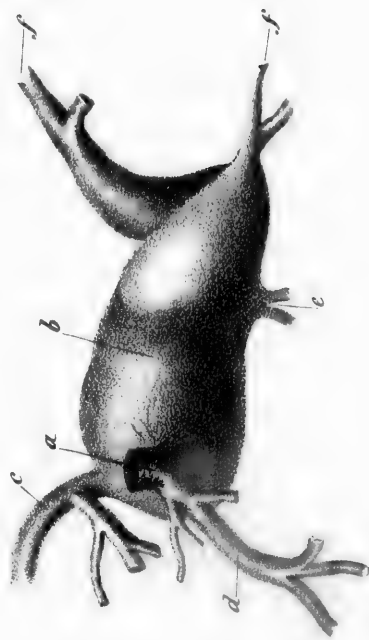
The hypertrophy is rarely simple, being accompanied as a rule with dilatation, and to this latter the train of ill effects in these cases is chiefly due.

In the case before us at some time or other mitral insufficiency was established, either from a dilatation of the orifice, so that the curtains could not meet to close it, or, what is more probable, as Bristowe pointed out, from a degeneration in the muscular papillæ and tendinous cords, resulting in a mal-adjustment of the valves. The apices of the papillary muscles were fibroid, in places calcareous, and the cords somewhat shortened so that they might readily be supposed in the dilated chamber to "tether the valves too closely and prevent the apposition of the segments." We may reasonably infer that this man had had an hypertrophied heart for years, the balance of power being preserved so long as the nutrition of the organ was kept up. With the onset of fatty degeneration came the disturbing element; the walls, no longer able to resist the blood pressure, gradually yielded, the dilatation overcoming the hypertrophy. With this would follow all the ill effects of loss of compensation as in ordinary cases, and just such as have been reported in this one; congestion and œdema of the lungs, dilatation of right chambers, general venous stasis.—all the symptoms in fact of a breakdown in that marvellous piece of machinery, the heart.









ANEURYSM OF THE HEPATIC ARTERY.

(a) Hepatic artery (b) right branch mainly involved, (c) left branch, (d) gastro-duodenalis, (e) celiac arteries, (f) occluded branches of right trunk.

See page 24.

MONTREAL GENERAL HOSPITAL.

PATHOLOGICAL REPORT

FOR THE YEAR ENDING MAY 1ST, 1877,

BY

WILLIAM OSLER, M. D.

OF MCGILL UNIVERSITY.

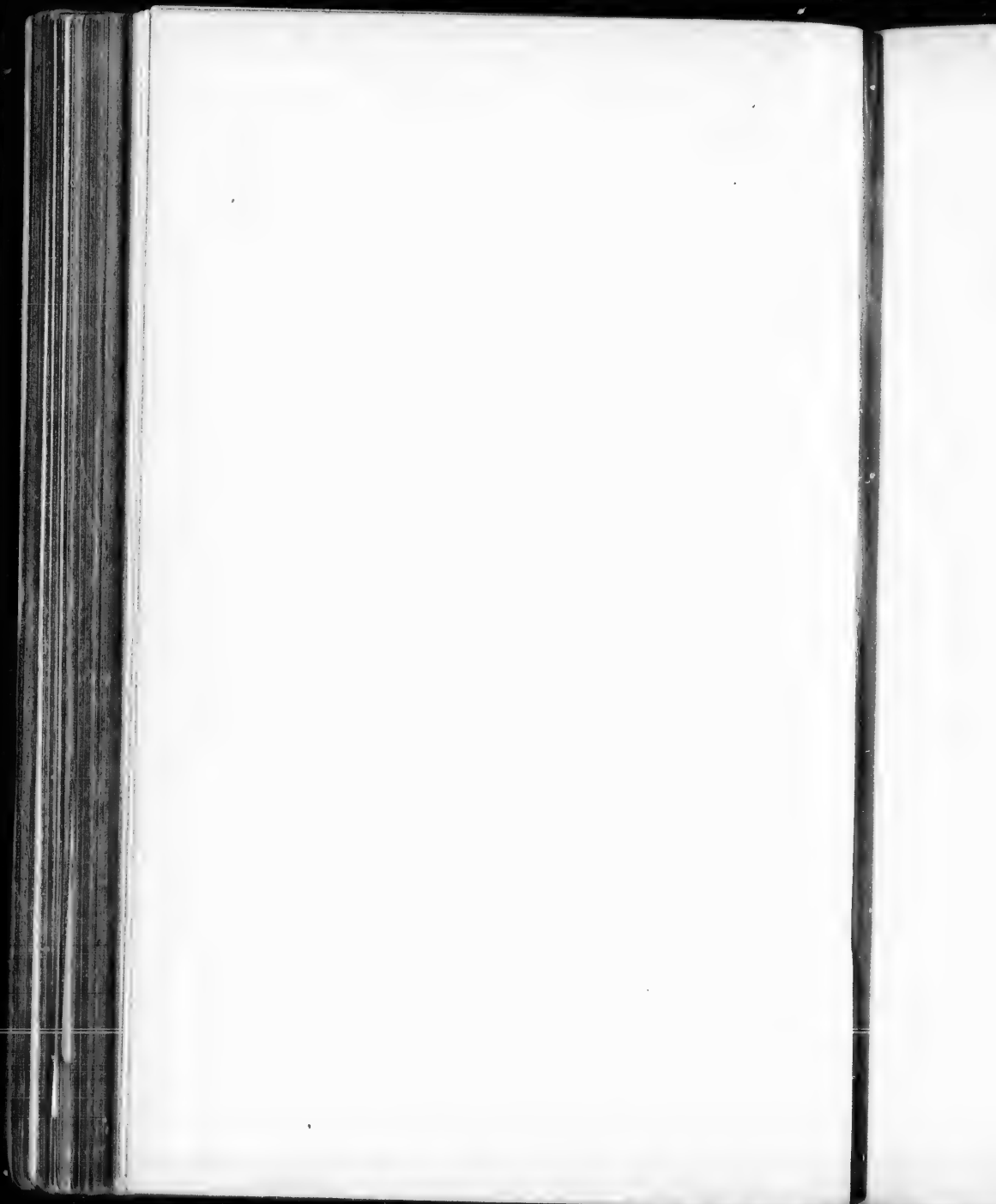
"Pathology is the basis of all true instruction in practical medicine."—WILES.

VOLUME I.

MONTREAL:

DAWSON BROTHERS, PUBLISHERS,

1878.



To My Teacher

JAMES BOVELL, M. D.

EMERITUS PROFESSOR OF PATHOLOGY IN THE TRINITY MEDICAL SCHOOL, TORONTO¹

THIS FIRST PATHOLOGICAL REPORT FROM A

CANADIAN HOSPITAL

IS GRATEFULLY AND AFFECTIONATELY INSCRIBED.

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PREFACE.

Records of exactly one hundred autopsies have been entered in the post-mortem book of the General Hospital for the year ending May 1st, 1877. A few of special interest occurring in private practice have been included.

The post-mortems are performed under my supervision by the students attending the Hospital, and the system of inspection followed is that of Virchow, at the Charité, Berlin, fully given in his "Sections Technik." The notes are taken on the spot from dictation.

In the following Report brief summaries are given of the cases of practical and scientific interest.

When possible, a synopsis of the clinical features is also given. The cases are grouped under the various organs affected, as this is thought to be a more convenient method than dealing with the individual diseases; and, as a rule, the organs are dealt with in the order of their pathological importance.

To the Medical Staff of the Hospital, by whose order the autopsies are conducted, I am deeply indebted, not only for permission to publish this report, but also for their kind courtesy in all matters relating to these investigations.

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PATHOLOGICAL REPORT.

MONTREAL GENERAL HOSPITAL.

OSSEOUS SYSTEM.—*Fractures.*

CASE LXXI.—*Fracture of 1st and 2nd ribs near vertebræ, from direct violence; deep abscess of the neck; obliteration of subclavian artery; Empyema.*

J. L., æt. 20, was struck on the sternum by the shaft of a fire engine; almost immediately after a tumour formed in the supra-clavicular region, the arm on that side became paralysed, and on admission was pulseless. Tumour inflamed, was opened, and discharged a milky fluid and blood, subsequently pus. Empyema supervened, and death.

Abscess found to be deep in the neck, immediately above the left pleura, and about as large as a good-sized orange. On putting the fingers into the sac the ends of the fractured ribs can be felt in the posterior wall. The fracture of the 1st rib is straight, just external to the tuberosity; the inner end is imbedded in the wall of the sac, the outer lies one and a half inches from it. The 2nd rib is fractured obliquely, just external to the angle, and is also comminuted. The inner end projects into the sac as a rough, sharp process, and lies at a higher level than the outer end which is external to it. Between the two is a small separated portion enclosed in the sac wall. The lining membrane of the cavity is stained, and in places covered with flakes of fibrin. Immediately below the anterior part of the floor of the sac, the apex of the left

lung is firmly attached, and is separated from the abscess by condensed tissue, $\frac{1}{4}$ of an inch in thickness. At the posterior part of the floor only a thin membrane separates it from the pleural cavity. An orifice, in communication with an external one at the root of the neck, exists at the upper part of the anterior wall. The subclavian artery runs along the inner and upper part of the sac, being lifted somewhat out of its course. It is completely obliterated by a thrombus, which begins an inch from the aorta and extends to the first portion of the axillary. The subclavian vein is also obliterated, though to a less extent. Above the artery, at the top of the sac, is the brachial plexus, the cords of which appear stretched and flattened.

Between two and three pints of pus in the left pleural cavity. Lung compressed.

Acute Necrosis—Pyæmia.

CASE LXXXIII. — *Necrosis of tibia. Ulcerative endocarditis. Pyæmic pneumonia.*

A. B., æt. 12, male. No definite history of an injury; pains of a rheumatic character about the joints, only slightly more marked at the left ankle; symptoms of pyæmia: death within a week.

Acute periosteal abscess found in the lower end of left tibia, with necrosis of the bone, which is denuded and roughened, especially in front. The cancellated part does not appear much affected.

Pericardium is beginning to inflame. In the anterior wall of the conus of the right ventricle is a purulent depot the size of a bean, and not far from it a superficial loss of substance, half the size of a three-penny-bit. Traces of atheroma in the sinuses of Valsalva.

Scattered throughout both *lungs* are small, firm, slightly-elevated spots, ranging in size from a pea to a marble. They are most abundant in the upper lobes. On section

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some are dark in colour, their firmness alone distinguishing them from the lung tissue; others have a greyish red appearance, while others again have softened in the centre, forming small abscesses. A small supernumerary *spleen* is present.

CASE XCVI. — *Necrosis of femur. Pyæmic pneumonia. Abscesses in superficial muscles. Pustular eruption on skin.*

J. C., æt. 30.—The clinical features of the case are well summarized by Mr. Vineberg,* as follows: The disease attacked a strong and apparently healthy man; no history of injury; the symptoms at the outset simulated those of rheumatism; the pyæmia set in rapidly, ran its course without rigors or marked fluctuations and remission of temperature, while the presence of a pustular eruption and erysipelatous patches on the skin, with the tuberos elevation beneath the skin—not unlike farcy buds—and the general symptoms, presented a clinical picture very like that of glanders.

Left Femur.—Muscles of anterior region of lower third of thigh infiltrated with pus, the posterior ones not so much so, and here and there are distinct abscesses. The periosteum of the lower end of the femur is raised, and contains beneath it much pus, the bone is bare and roughened in front, behind, and on the inner side; on the outer side the periosteum is still adherent. It is covered with a dirty greyish exudation. Scrapings from the bone and roughened surface examined with the microscope show an enormous number of large myeloplques. The marrow where the bone is sawn looks healthy; that of the end of the bone itself was not examined.

Skin.—Numerous flattened pustules with reddened bases exist over the skin of trunk and upper extremities.

Muscles.—In those of the arms and legs many small

* In a paper read before the McGill Medical Society, May 8, 1877.

tuberous swellings can be felt, which, on section, are found to be abscesses in the substance of the muscles.

Long int. saphenous vein occluded by a thrombus.

Blood dark and fluid. During life there was a large number of Schultze's granular masses, and the net-work of fibrin fibrils which separated out on the slide under the microscope was unusually dense and coarse.

Commencing *Pericarditis* over right auricle.

Lungs. — Numerous firm, slightly-elevated, nodules, ranging in size from a pea to a marble, in all the lobes, but most abundant in the lower. On section, most of them present a white granular surface, interspersed here and there with hæmorrhages; some of the larger ones in the lower lobes have softened at the centre into abscesses. The margins of these pneumonic areas are congested, sometimes hæmorrhagic.

Cancer.

CASE LXXXII.—*Primary Cancer of bodies of 2nd and 3rd vertebræ and heads of corresponding ribs on right side. Secondary masses in ribs, liver, and brain. Chronic phthisis. Lobar pneumonia.*

M. C., æt. 52:

Vertebræ, 2nd and 3rd. Bodies not enlarged, but soft and porous. On stripping off the anterior ligament, a soft, greyish-white juice oozes out. The transverse and articular processes also involved. Two soft cancerous growths spring from the junction of the laminae and body of the 2nd, and encroach upon the calibre of the canal; at the centre of the back part of the body of the 3rd, is another tuberous outgrowth. The cord does not appear much compressed by these masses, and the membranes are unaffected.

Ribs, 2nd (right side). For two inches beyond the angle the bone is enlarged, double the size of the 3rd; the articular surfaces are bare. The compact tissue has disap-

peared, and the cancerous growth has elevated and infiltrated the periosteum. On section large cancellæ are seen, filled with a reddish-white juice. At the middle of this rib is an irregular swelling, one inch in length, which presents the same appearance as the head.

3rd Rib (right). Not nearly so much enlarged, the articular surfaces not affected. Compact tissue gone, but periosteum is free.

8th Rib (left). An elongated swelling about the middle, one and a half inches in length, most marked internally. On section external part soft and cuts readily; the central part is hard and dense.

9th Rib (left). A still larger swelling of same character, two inches in length; not hard in the centre, but not so porous as the heads of the affected ribs.

Liver not enlarged; contains a dozen or more white masses, situated superficially, ranging in size from a walnut to a small pea; surfaces of most on a level with liver—the larger are elevated and with depressed centres. On section many hæmorrhagic centres are seen in them.

Brain. A rounded cancerous mass— $1\frac{1}{2}$ " by $1\frac{1}{4}$ "—occupies the superior parietal convolutions of the right side, extending into the longitudinal fissure for a short distance. On section it is greyish-yellow in colour, except at the centre and margins, where there is more blood. Small masses also in the right corpus striatum and left thalamus opticus, and on the pia mater of the lower convolution of the left occipital lobe, and on the pia mater of the right crus cerebri. All of these, on examination, are cancerous in character.

Lungs. Left is emphysematous, several very large blebs existing near the root. Throughout both lobes are numerous, firm, fibroid tubercles, ranging in size from a pin's head to a pea. Lower lobe is solidified, in a state of red hepatization, the air cells being filled up with fibrinous plugs.

The right lung contains hardly any air. At the lateral part of the upper lobe is a large dense caseous mass, the size of an orange, with a sharp, round contour towards the lung, and much puckered on the pleural surface. It is very firm, and on section beautifully marbled. At the lower and back part of this lobe the lung presents a very peculiar appearance over an area equal in size to an orange; it is irregular, soft, and spongy; no definite cavity exists, but the tissue at the upper part is soaked with pus, while below there is pus mixed with blood. It looks not unlike the fibrin of blood clot soaked with pus but on examination proves to be a rapidly breaking down lung tissue, infiltrated with cellular elements. The pleura over it is very thick and fibrous. Nearly the whole of the lower lobe is in a condition of grey induration, being firm, airless, and scattered through it are a few caseous masses.

CIRCULATORY SYSTEM.—HEART.

Of five cases of heart disease, one only presented features of unusual clinical and pathological interest. It is an instance of hypertrophy with dilatation and advanced fatty degeneration, consequent, I believe, upon prolonged muscular exertion. I am indebted to Dr. Ross, under whose care he was, for permission to use the clinical notes taken by Dr. James Bell, at that time the ward clerk.

CASE XLIV.—*Hypertrophy and dilatation of the heart. No valvular or arterial disease. No chronic kidney affection. Hydrothorax. Pulmonary apoplexy. General venous stasis.*

J. W., æt. 39, coachman; admitted November 2nd, 1876, with dyspnoea, hæmoptysis and vomiting. He is a large, powerfully built man, with strongly developed muscles, and in good condition. His family history is good. Was a soldier for 18½ years, serving in India and other British stations. Never had syphilis or rheumatic

fever. Has always been a healthy man, though intemperate. In July last he suffered from shortness of breath and slight hæmoptysis, for which, in August, he entered the hospital, and was under treatment nearly two months for "some heart affection," being discharged very much improved. He then worked for three weeks as a day labourer, and suffered much from exposure to cold and wet. On October 20, he had a chill, which was followed by swelling of the legs and abdomen, with slight dyspnoea. He gave up work on the 24th, and was treated as an out-door patient for a few days before entering Hospital on November 2nd. When admitted, in addition to the above mentioned symptoms, he complained of great pain over the region of the heart. The legs were œdematous, and the conjunctivæ and face of a sub-icteroid hue. On physical examination, the cardiac dulness is found to extend as high as the upper border of the 3rd rib, and to the right border of the sternum. A systolic murmur was heard at the left edge of the sternum in the 3rd interspace. Apex beat cannot be distinctly felt. The pulse at the wrist is barely perceptible. There is dulness over the lower lobe of the left lung. Rough snoring râles are heard over the front of the chest, and coarse bubbling râles behind. Liver dulness extends from the 5th interspace to the costal margin. The urine contains nearly 25 p. c. of albumen. The day after admission, he expectorated nearly 3 pints of florid blood, and vomited very frequently. In spite of treatment (dry cupping, ergot, digitalis, etc.), his condition became worse. On November 5th, the pulse was quite imperceptible at the wrist, the cyanosis became extreme, and the patient died early on the morning of the 6th, with all the symptoms of chronic valvular disease.

Post mortem, 30 hours after death. Face, neck and skin of thorax intensely livid. Tissues beneath the skin of anterior part of trunk and about the root of the neck

emphysematous. Scrotum much swollen. Leg œdematous. *Pericardium* contains 3ii of serum; sub-pericardial fat tolerably abundant. *Heart* weighs 610 grms. ($21\frac{1}{2}$ oz.) Right chambers distended with dark clots and fluid blood; the venæ cavæ are also dilated and full, much blood escaping from them in the removal of the organ. Right auricle is very large, size of a small orange; walls of about the usual thickness. Right ventricle dilated, anterior wall measures $\frac{1}{4}$ " in thickness; columnæ carneæ are not hypertrophied. Tricuspid orifice $5\frac{1}{8}$ " in circumference; valves healthy. Pulmonary valves normal; circumference of orifice 3". Left ventricle contains some fluid blood, and a small partially decolorized clot in the mitral orifice. The chamber is much dilated, measuring $4\frac{1}{2}$ " from apex to aortic ring, and bulges considerably towards the right ventricle. Endocardium thick and opaque, especially over the septum. Musculi papillares fibroid at apices. Walls, over middle of anterior part, $\frac{7}{8}$ " in thickness; posterior wall $\frac{1}{2}$ "; ventricular septum, a quarter of an inch below aortic valve, $\frac{1}{2}$ ". Mitral valves slightly thickened at the edges, otherwise healthy. Orifice measures $4\frac{1}{4}$ " in circumference. Aortic valves competent, segments thin and natural looking; orifice, at the ring, measures $2\frac{3}{4}$ " in circumference. Aorta looks—relatively—smaller than natural. It is not atheromatous, either in the arch or in its course. Muscular substance of whole heart, and especially the left ventricle, looks pale, and on examination is found in a condition of advanced fatty degeneration; a good deal of fatty infiltration also exists between the individual fibres. *Arteries* of the body do not present any signs of degeneration.

Lungs. 3xcvi of serum in left pleura, and the lung on this side is collapsed and only slightly crepitant above. Two very large spots of apoplexy in the anterior part of upper lobe, and about them the lung tissue is hepatized. Another, also large, occupies the anterior border of the lower lobe. Right lung is crepitant, but contains much

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blood and serum. At the lower part of anterior lobe in front is a small, consolidated area.

Spleen, 250 grms., firm.

Kidneys, not enlarged. Capsules detach easily; surfaces smooth. On section pyramids and Malpighian tufts of the cortex are injected.

Stomach and intestines present nothing unusual; the large and small veins are very full.

Liver, a little enlarged, of good consistence; venules of hepatic vein gorged—nutmeg organ.

Brain. Sinuses of dura mater and veins of the pia mater full. Arteries at the base not diseased. Nothing abnormal in the substance.

When this case came under observation in the autopsy room, I confess to have been not a little puzzled, and so impressed was I at the time with the unusual character of the lesion that a most searching examination of the different organs was made, and accurate measurements of the heart taken. There were none of the common causes present to account for the hypertrophy of the heart—no valvular disease, no arterial degeneration, no chronic renal or pulmonary disease; and though aware of the fact that an idiopathic (so-called) hypertrophy of the heart was described, still, I did not know that a fatal issue might follow in such a case with all the symptoms of chronic valvular disease; nor did a consultation of the various works on the heart guarantee such a supposition. A few months after, in Nos. 17 and 18 of the *Berliner Klinische Wochenschrift*, 1877, an article appeared upon a fatal case of dilatation and fatty degeneration of the heart, consequent upon prolonged muscular exertion, which in its symptoms and anatomical characters is almost the exact counterpart of the one here recorded, except that the dilatation was a little more marked, and the hypertrophy not so great. On making enquiries it was ascertained that this patient had always been a very powerful, muscular man, and since his discharge from the army had worked

as a blacksmith. Unfortunately, his wife, from whom alone definite information could have been obtained, left the city soon after his death, so that the details of his past life are necessarily incomplete. However, in the absence of all the commonly recognized causes of heart disease, it appears reasonable, with the evidence of Albutt, Meyers, DaCosta, Seitz, Thurn, and others before us, to attribute the lesion in this case to overstrain or prolonged muscular exertion.

The case, however, is one of such unusual interest that I propose to deal with it more fully in a separate paper.

Fenestration of the valves.—In exactly 20 per cent. of the cases were these peculiar little perforations met with in the aortic valves, while in the pulmonary semi-lunar they occurred in only 7 per cent. They are either congenital or result from atrophy, and probably have no pathological significance.

ARTERIES.

Atheroma.—In twenty three cases the aorta presented signs of this degeneration, usually slight in amount. In five instances the arch was dilated and the atheromatous condition very marked.

Aneurism.

CASE XXXVI.—*Aneurism of commencement of thoracic aorta, unsuspected during life. Death from general Tuberculosis.*

A. B., æt. 32, a well-built muscular man. The aorta presents at the arch several calcareous plates and patches of atheroma. A large aneurism, the size of the fist, formed just below the termination of the arch. It contains numerous fibrinous laminæ. The posterior wall of the sac is formed by the 3rd, 4th and 5th dorsal vertebræ, which are bare, and eroded.

Left ventricle hypertrophied; valves of the heart normal. The lungs stuffed with recent tubercles, and at

the apices small caseous masses. It is an interesting fact that, so far as could be ascertained, this patient had never suffered from any symptoms of aneurism.

CASE XLIX.—*Sacculated aneurism of ascending portion of arch of aorta. Rupture into the right pleural sac.*

J. C., æt. 40, a well-built muscular man. A little to the right of the middle of the sternum is an irregular oval swelling. On opening the thorax the cartilages of the 3rd, 4th, and 5th ribs on the right side, with the corresponding portion of the sternum, are found much eroded, the 3rd cartilage having almost entirely disappeared. The sac of the aneurism lies immediately beneath the sternum, which, with the above-named cartilages, forms its anterior wall. In the rest of its extent the wall is made up chiefly of condensed pleural and mediastinal tissues. It springs from the right side of the ascending part of the arch, with which it communicates by a rounded $\frac{1}{2}$ " in diameter, the margins of which are thick and project into the sac. The contents consist of fresh coagula and old laminæ of fibrin; the entire mass when removed from the sac filled the two hands.

The site of rupture was discovered at the right side of the sac, close under the ribs, at which point the blood had burst into the right pleura through an opening $\frac{1}{4}$ " in diameter.

The right pleural cavity is full of coagulated blood, the serum floating uppermost. A large clot, forming a mould of the cavity and grooved by the ribs, was removed entire, and weighed $3\frac{1}{2}$ lbs. The lung on this side is compressed and airless; the visceral layer of the pleura over it rough, and covered with minute patches of lymph. The left ventricle is hypertrophied; muscle of good colour. Aortic valves a little thickened and puckered at the edges. Patches of atheroma exist in the intima of the arch.

CASE LXXXVII.—*Sacculated Aneurism of aorta, at termination of the arch; unsuspected during life. Death from Pn monia.*

J. W.,  t. 62. Died 18 hours after admission.

Heart. Left ventricle contains a dense decolourized clot, walls considerably hypertrophied. Aortic semi-lunar valves thick and atheromatous at bases and about corpora Arantii.

Aorta.—Whole arch dilated, the intima thickened and rough. At the end of the descending portion there is a sacculated aneurism, the size of a billiard ball, projecting from the antero-lateral part of the vessel toward the right side. The orifice of communication with the sac is $1\frac{1}{8}$ " by $1\frac{1}{8}$ " in diameter. The intima terminates by a rounded margin at the orifice. The wall of the sac is made up chiefly of the outer coat, and is lined with condensed lamin e of fibrin.

CASE LIII.—*Aneurism of Hepatic Artery. Right branch almost obliterated. Multiple abscesses in the Liver.*

W. H.,  t. 21. Admitted into Hospital Nov. 8, 1876, under Dr. Ross, died Dec. 7. Symptoms those of abscess of liver. For clinical report by Dr. Ross, see *C. M. and S. Journal*, July, 1877.

Rigor mortis present. Skin of a dirty-brown colour. In the abdomen about 22 oz. of yellow turbid fluid. In the right pleural cavity about 20 oz. of similar fluid. *Right lung* collapsed. The pleura covered with a thin layer of greenish-yellow lymph. On section, the lung dark, airless, and sodden. *Left Lung.* On the visceral layer of the pleura, especially behind, are numerous small ecchymoses. On section, organ contains much blood, is firm, and only slightly crepitant. *Heart* normal. *Kidneys* rather pale, cortex swollen, and Malpighian tufts injected. *Spleen*, weight 445 grms. (14 oz), adherent to the stomach.

Organ soft. On section dark and congested. *Intestines* normal. No trace of ulceration in the large bowel. *Bladder* and prostate, normal.

Liver, weight 4879½ grms. (10¾ lbs). The peritoneum around it in many places shows signs of inflammation, the left lobe being intimately adherent to the stomach by a thick layer of firm yellowish-coloured lymph; the right lobe is also cemented to parts in its neighbourhood by lymph of a similar character. A small amount is also observed on the descending colon, but the general peritoneal surface is not affected, the serous covering of the intestines being clear and glistening. The liver itself retains its normal shape, the upper surface is smooth and not adherent. Towards the right border a yellowish-coloured swelling is evident, which is perceptibly fluctuating. Other less distinct yellowish spots are seen scattered over the organ. To the touch the upper and back part of the right lobe is exceedingly soft and fluctuating. On the under surface many yellowish-white nodules are apparent, some large, others quite small, all distinctly fluctuating. A similar one of large size is apparent on the under surface of the left lobe. A transverse incision through both lobes reveals the fact that we have to deal with a diffuse suppurative hepatitis. An immense quantity of yellowish-white, custard-like pus flowed out. The right lobe is completely honey-combed by a series of small, closely united abscesses, ranging in size from a marble to a walnut. The septa between these are composed of a dark-red tissue. Most of these small abscesses communicate together; some have merged to form larger ones. They all possess distinct lining membranes, which are frequently stained with bile. The left lobe is in a similar condition, and in both the abscesses extend throughout the thickness of the organ. Thus, the only portions of liver-substance which are found comparatively free are the lobus quadratus and

that portion of the organ lying immediately above and a little to the left of the gall bladder. These parts on section are of a dark colour, lobules distinct, small bile vessels very evident. The gall-bladder is small, contains about three drachms of a clear, somewhat viscid secretion. On pressing it and along its ducts no fluid could be forced out at the papilla biliaria. It was with much difficulty that a probe could be passed along the cystic duct, owing to an unusual number of irregular folds in the mucous membrane, which are evident on slitting up the duct. The common bile duct itself is patent, the mucous membrane of its upper two-thirds stained with bile. There are no clots in the superior mesenteric, gastric, or splenic veins. On slitting up the portal vein itself, a small abscess is found projecting into the calibre of one of its right divisions. The tissue in the neighbourhood of these main divisions is infiltrated with pus.

A firm nodule was felt at the portal fissure and mistaken at first for a bunch of lymph glands. Section of this, however, showed it to be distinctly laminated, and careful dissection of the part revealed the existence of an *aneurism* just at the bifurcation of the Hepatic Artery, but occupying chiefly the right branch (see frontispiece). The dilatation begins immediately beyond the gastro-duodenalis (*d*), and extends for about three inches as a somewhat conical swelling. The left hepatic artery (*c*) arises from the obtuse end of the aneurism and is unaffected. At the thickest part its circumference measures three inches. For $2\frac{1}{2}$ inches it passes to the right and gives off two branches (*f*) which appear occluded, then turns at right angles and passes backwards for $1\frac{1}{2}$ inches towards the posterior border of the liver, terminating by a conical extremity which is continuous with the main branch of the artery. The arteries of the body had been injected, and the red mass is found in the trunk of the hepatic before

its bifurcation, in the gastro-duodenalis, and the left hepatic branches, all of which are full and tense. The hepatic artery appears to enter the aneurism about $\frac{1}{4}$ of an inch from the obtuse end, the gastro-duodenalis and left hepatic being given off apparently from the dilatation itself, and on slitting up the hepatic artery it appears at first sight as if these were its only branches, and that its communication with the aneurismal sac had become obliterated. Careful inspection, however, of the lower and posterior wall reveals a small canal, the calibre of a hypodermic needle, which leads directly into the sac. The aneurism being opened by a longitudinal cut on the upper surface, it is seen that the anterior third, comprising the rounded end, is completely filled with firm decolorized laminæ of fibrin, concentrically arranged. The middle third of the sac contains semi-coagulated blood and red injection mass, after emptying which there is seen a cavity about the size of a small walnut. This is in communication with the hepatic artery by the small canal already referred to, which passes for rather more than half an inch through the fibrinous laminæ of the anterior end. Two small branches, both containing injection, pass from the cavity, one, the cystic, (e) going to the gall-bladder, the other, a somewhat larger branch, passing to the central part of the organ. The sac is lined with sheets of fibrin which at the under part are thinner than elsewhere, and at this point the blood has infiltrated the proper coats of the aneurism, which, in consequence, look reddish black. The terminal portion of the sac lies chiefly in the substance of the right lobe, surrounded by suppurating hepatic tissue, which had to be dissected away to expose it; and on section the cavity is found almost completely obliterated by fibrinous laminæ, which in the centre are softer, and not so colourless as at the other end of the sac. No direct passage could be traced through this from the central cavity, and the main

branches given off from the aneurism are found empty, and at their commencement plugged with fibrin, which in several extends as a thin sheet along the intima.

The condition appears to be one of simple aneurismal dilatation of the vessel, the walls being thin, slightly roughened on the interior, but not markedly atheromatous. The trunk of the hepatic artery itself looks healthy, and there are no evidences of general vascular degeneration.

Among the many interesting points in connection with this case, the causation of the multiple abscesses takes the front rank; not only because in this one alone among the recorded cases was the fatal termination due to a suppurative hepatitis, but also on account of the extreme rarity of an opportunity to study the effects of disease of the hepatic artery upon this organ in man. Taking for granted, as from the careful examination we may justly do, that the portal system did not in this instance furnish the *materies morbi*, we have to consider the consequence of total obliteration of the hepatic artery, or of its main branches, and also the effect of small emboli, in the form of particles of fibrin, plugging its terminal twigs.

It will be necessary first to refer briefly to a few anatomical and pathological points in connection with the blood supply of the liver. This, as in lungs, is two-fold; the portal vein ministering solely to the functions of the gland, the hepatic artery chiefly to its nutrition. The ultimate branches of the portal vein anastomose at the periphery of the lobules, forming the interlobular vessels, from which numerous capillaries pass into the interior, and finally converge to the centres of the lobules, as the ultimate radicals of the hepatic veins. The hepatic artery furnishes blood to the bile ducts, portal and hepatic veins, and the connective tissue of Glisson's sheath. Its capillaries empty their blood by small venules into the interlobular veins. Hence, remembering this distribution of

the hepatic artery, it is easy to understand that in cases of thrombosis of the portal vein, even where the obstruction is complete, the functions of the organ may be maintained, and both bile and glycogen secreted; for the capillary plexus of the lobules continues to receive through the interlobular veins the blood which has been emptied into the latter from the venules of the hepatic artery. The nutritive blood serves as a substitute, acts vicariously, for the functional. It has been maintained, and the statement passes current in the text-books, that the converse of this is true, viz: that the portal blood can replace the hepatic, the functional act for the nutritive. This view is based on experiments made upon the lower animals.

Schiff states that in the cat the functions of the liver are performed just as well after ligature of the hepatic artery as before; and Betz found that in the dog, after tying the trunk of the hepatic and all the collateral branches, no important alteration took place either in the structure of the liver or in its secretion.

Cohnheim and Litten have shown, however, in a very important paper on "Disturbances in the Circulation of the Liver," (Virchow's Archiv. May, 1876), that in experiments on dogs arterial blood still reaches the liver even after ligation of the hepatic, the coronaria ventriculi, and the gastro-duodenalis, owing to the very extensive anastomoses and connections of these vessels. In the guinea pig, on the other hand, the supply of arterial blood can be completely shut off, either from the whole organ or from individual lobes. In the former case the operation is always fatal within 24 hours, and even in this time important changes are found to have taken place in the organ. These are all the more marked if, instead of ligating all the arteries, only the one going to the extreme right lobe be tied. The result is an entire necrosis of the portion of the liver supplied by the ligatured

artery, and in every instance the animal died within two days.

Cohnheim states that pathological proof of the correctness of this view is as yet wanting, but I am inclined to believe that by this case the deficiency is supplied; for I think the suppuration of the organ best explained on the view, that the shutting off the supply of blood, either by the gradual occlusion of the aneurism by clots, or by the quicker process of emboli conveyed away from the interior of the sac, produced numerous areas of necrosis, which subsequently became, by inflammation and a sequestering suppuration, converted into abscesses. It is impossible to determine, in the absence of any positive evidence, whether the process resulted from emboli or simply by the gradual obliteration of an important blood channel; and in any case there are certain difficulties which will occur to the minds of many in the view here suggested. There are at least two cases on record of total obliteration of the artery without consecutive suppuration, one of which was from aneurism. Still, this, if occurring gradually, and not involving the pyloric artery, need not necessarily, as the above-mentioned experiments prove, deprive the liver of arterial blood. There is no reason to suppose that the obliteration in this case did not occur slowly, for the fibrinous laminae, especially at the anterior end, were firm and tough. Again, on an embolic theory it might be urged that in this instance the emboli, consisting of fibrinous shreds from an aneurismal sac, should have produced simply mechanical effects, infarctions, and not, as in the case of emboli proceeding from necrotic or suppurating foci, abscesses. Mechanical emboli do, however, sometimes produce suppuration, and in the liver might do so by causing death of the structures supplied by the obstructed arteries, viz: the portal vessels, bile ducts, and connective tissue of Glisson. In the present case, sup-

posing the process to depend on emboli, there would be arterial blood enough sent through collateral branches to furnish material for an active suppuration about the necrotic centres. Altogether, the embolic theory meets the case better than any other. It is to be remembered also, that the disease was not rapidly fatal, but came on slowly, lasted five weeks or more, and it is not unlikely that during this time much of the fibrin was deposited, and the obliteration of the distal end of the aneurism took place. This is rendered still more probable by a consideration of the condition of the left hepatic branch, the commencement of which is involved in the aneurism, but which now, owing to the filling of the proximal end of the sac with fibrin, appears to be almost the direct continuation of the main trunk. In fact, for a short distance from the bifurcation, the upper wall of the left branch is made up of condensed fibrin, which is grooved by the blood channel. This explains, too, the occurrence of the abscesses in the territories supplied by the left branch. The almost entire obliteration of the obtuse end of the sac occurred, most probably, after the mischief had been started by the escape of emboli. The appearance of the abscesses adds further support to this view. None of them looked recent or contained shreds of necrotic liver tissue, but all were filled with a creamy pus, and had walls lined by definite pyogenic membranes.

There is no clue to the origin of the aneurism itself. The age of the patient, and the absence of arterial degeneration elsewhere, are almost sufficient to exclude atheromatous degeneration as a cause, and the walls of the sac appear thinned but not evidently diseased. Of other agencies capable of producing aneurism, especially of smaller vessels, embolism is the most important, and, even in the absence of valvular disease, and remembering the unfavorable position of the hepatic artery for emboli, we are inclined to regard it as the most probable cause.

It is scarcely possible, considering the situation of this artery, that strain could have had anything to do with its production.

CASE XLVIII.—*Aneurismal dilatation of branches of pulmonary artery on the walls of phthisical cavities. Death from hæmoptysis.*

J. L., æt. 44, ill for some time with phthisis, died unexpectedly of hæmorrhage from the lungs.

Lungs.—Seven cavities, in size from a walnut to a small orange, found throughout the organs, chiefly in the upper lobes. Five of these contain blood with clots. Caseous masses numerous, and here and there small tubercles. On section of the lower lobes, irregular areas of a darker colour are noticed on the congested surface, which on inspection are seen to be small bronchi filled with clots, the lung tissue about them being deeply stained. On slitting up the branches of the pulmonary artery three aneurismal pouches, the size of peas, are met with in vessels running on the walls of cavities. They appear to be simple diverticula of the vessels, the intima being continued into them. From the side of the cavities they look like little irregular swellings on the wall. The origin of the hæmorrhage was not discovered, though all the branches of the pulmonary artery in the right lung and lower lobe of the left were slit up. The vessels of the upper lobe of the left lung were, by mistake, not examined.

No doubt the hæmorrhage in this case was due to the rupture of one of these small aneurisms—the cause of the hæmorrhage in most of the cases of death from hæmoptysis in chronic Phthisis. (See Ramussen, *Edinburgh Medical Journal*, 1868, and Powell "*Trans. Path. Soc.*" xxii.)

CASE IX.—*Aneurism at second bifurcation of the right middle cerebral artery. Rupture; extravasation of blood into*

the Sylvian fissure, and laceration of substance of the temporo-sphenoidal lobe. Death in 36 hours.

Mrs. R., æt. 40. See report of case by Dr. Bell.—*Can Med. and Surg. Journal*, August, 1876.

Post mortem, 11 hours after death.

Body that of an average sized, poorly nourished woman.

Head—Nothing special noticeable about the soft parts or the calvarium. Veins of the pia mater moderately full of blood; sub-arachnoid fluid scanty. In the removal of the brain, clots are met with in the neighbourhood of the middle fossa of the base of the skull on the right side, and they are seen to have proceeded from a large extravasation which had taken place in the right Sylvian fissure. The convolutions of the middle lobe in the vicinity are considerably lacerated, the brain tissue broken down and replaced by a dark clot. About a handful of coagulated blood was removed, most of which was in and about the Sylvian fissure. Only a thin layer of blood exists at the base, around the optic commissure and perforated spaces. A delicate coagulum also extended over the convolutions in the lateral region on the right side. The circle of Willis and middle cerebral artery were removed for subsequent examination. The substance of the brain appears healthy; the ventricles are empty, and nothing abnormal is observed about the ganglia at the base. On carefully washing away the clots from the right middle cerebral artery, the source of the hæmorrhage was ascertained to be a small aneurism, situated in the fork of the chief bifurcation of the vessel. This had ruptured, and the blood had escaped through a large ragged orifice. The remaining vessels of the brain were found healthy, no atheromatous change being detected in their walls.

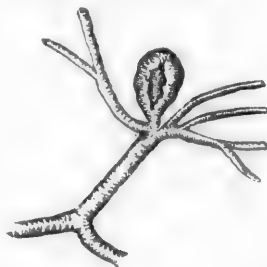
Abdominal organs healthy; no affection of the kidneys

A beautiful false corpus luteum was found in the left ovary (she had menstruated exactly three weeks before), measuring fully $\frac{3}{8}$ of an inch in diameter, and with a pale

yellow convoluted wall. The central coagulum was of a dark red colour. In the same ovary at the other end was a small corpus luteum about $\frac{1}{2}$ the size of the large one, with a decolorized coagulum and much more convoluted wall.

Uterus somewhat enlarged. Mucous membrane appeared congested and tumefied.

The situation, size and appearance of the rupture are well shown in the annexed wood-cut.



RESPIRATORY SYSTEM—TRACHEA.

CASE LXI.—*Ossification of greater portion of mucous membrane of trachea.*

This curious condition was met with in a case of Addison's Idiopathic Anæmia.—(See *Can. Med. and Surg. Journal*, March, 1877.)

J. A., æt. 47.

Trachea.—Beginning just below the cricoid cartilage, and extending to the bifurcation, the mucous membrane is represented by irregular ossific plates, which towards the front of the tube and near the main bronchi form a continuous bony membrane. The free surface is denuded and very rough, numerous pits and projections alternating with each other. Towards the bronchi the ossified membrane is thicker, and firmly united to the subjacent cartilages.

LUNGS.—*Pneumonia.*

Of 14 post mortems in cases of pneumonia the following are of special interest.

CASE X.—*Pneumonia of the upper lobe of the right lung ; extensive meningeal inflammation.*

H. F., æt. 38. In hospital four days. For clinical report, see *Can. Med and Surg. Journal*, August, 1876.

Lungs.—The upper lobe of the right lung, with the exception of the anterior and lower borders, is in a state of red hepatization. The bronchial tubes of the consolidated area are uniformly filled with fibrinous plugs. The other lobes of this, and the whole of the left lung, are engorged, much blood and serum escaping on section. Scattered over the visceral pleura of both lungs, chiefly at the base, are small, white, firm granules, feeling to the touch like small shot, and resembling miliary granulations. Some of them are flatter, others are situated upon fibroid bases, and on examination they prove to be fibrous outgrowths of the pleura.

Brain.—On removal of the dura mater, the longitudinal fissure is seen filled with yellowish-white lymph, and the Sylvian fissures are in the same condition. A thick layer of lymph exists about the optic nerve, extending over the perforated spaces to the pons, and on either side to the under surface of the temporo-sphenoidal lobes, and posteriorly over the medulla and contiguous portion of the cerebellum. A considerable amount of greenish-yellow lymph exists over the superior convolutions of the frontal lobes, and the same is seen in small quantities upon the parietal convolutions. Upon the left occipital lobe is a thin layer of extravasation. The vessels of the pia mater are moderately full. On section the white substance is glistening and moist. Fornix and septum exceedingly soft. Ventricles contain a moderate amount of fluid,

and their walls are soft. Here and there on the course of the vessels are small extravasations, and the same are noticed along the vessels on the fourth ventricle. No trace of miliary tubercles found about the vessels or parts at the base.

CASE XV.—*Almost entire hepatization of left lung, with small pneumonic area in right. Extensive diphtheritic Colitis*

M. S., æt. 22. In hospital six days.

Lungs.—With the exception of the apex, the whole of the left lung is solidified, and in a state of red hepatization. The visceral pleura is inflamed and covered with a layer of lymph, which in the fissure between the lobes is very thick. In the posterior part of the lower lobe of right lung is a patch of hepatization the size of an orange.

Large Intestine.—The mucous membrane of the cæcum is covered over with a thin layer of yellowish, firmly adherent lymph, which can be stripped off, showing a much injected surface beneath. The first foot of the colon presents nothing abnormal, but in the next eighteen inches the mucous membrane is congested and covered with elevated patches of lymph, many of which are isolated, the majority, however, being united and arranged in a linear direction. The patches are elevated, the isolated ones of the same shape and size as rupia crusts; on section they are seen to extend through the whole thickness of the mucous membrane. These patches occur throughout the descending colon and sigmoid flexure; in the latter region there is an irregular one, 4" in length.

CASE LXII.—*Diabetes, phthisical cavity in right lung surrounded by hepatized tissue.*

J. W., æt. 26. Clinical history, *Can. Med. and Surg. Journal*, August, 1877.

Lungs.—Posterior part of upper lobe of right lung is occupied by an irregular cavity, elongated in form, hold-

ing about an ounce. The walls are made up of a dirty brown, pasty material, caseous in character. There are no fibroid or other changes about the cavity, but it is surrounded by lung tissue in the second stage of pneumonia. The whole of the lower lobe of this lung is solidified, and the lower lobe on the other side is in the same condition

CASE LXIII.—*Chronic phthisis. Almost entire destruction of both lungs. Healthy portion involved in a pneumonia.*

J. F., æt. 35. In hospital for a long time, caught cold, and died of inflammation of the only sound portion of his lungs.

Lungs.—Right lung, with the exception of anterior half of lower lobe, is a mass of cavities and caseous nodules. The unaffected part is in a condition of red hepatization, a few firm nodules being seen in it. The pleura over it is covered with a thick layer of recent lymph. Left lung almost entirely destroyed by cavities.

CASE LXIV.—*Simple pneumonia of left lung, right-sided pleurisy.*

A. G., æt. 22, ill 6 days.

Lungs.—Three and a half pints of serous fluid in right pleural sac. The pleura of lower and middle lobes is covered with thick lymph. Both of these lobes collapsed and airless. Anterior two thirds of upper lobe of left lung in condition of red hepatization; the pleura over it not involved in the inflammation; rest of the organ in a state of acute œdema.

CASE LI.—*Pneumonia of right lung, uniform involvement of pleura covering it.*

H. L., æt. 36.

Lungs.—Right uniformly hepatized. The visceral layer of pleura extensively inflamed and covered with a dense layer of yellowish-white lymph, in places, fully $\frac{1}{4}$ " in

thickness. Left lung much engorged and cedematous. Right lung weighs 3 lbs. 6½ ounces; left, 1 lb. 13 oz.

Remarks.—Throughout the past winter pneumonia prevailed to an unusual extent, and was very fatal, especially to elderly and debilitated persons. Ten fatal cases occurred in the General Hospital, some of which, as above recorded, presented very interesting pathological features. Foremost among these is the case complicated with simple meningitis, a rare, and, from a clinical stand-point, puzzling complication, the pneumonic symptoms being masked by the cerebral phenomena, and rendered liable to be over-looked. It is interesting to note that the pneumonia was of the upper lobe, a situation which, when affected, appears more liable to be accompanied with brain symptoms, delirium, &c.

The complication of diphtheritic or croupous colitis in pneumonia is not referred to in any of the text books on Pathology or Practice of Medicine which I have consulted. Dr. Bristowe* was the first, so far as I can learn, to call attention to this condition, which he found in two out of 30 cases of secondary pneumonia, and in four of 16 cases of the primary disease. The distinct false membrane on the mucous surface of the cæcum in the above case corresponds with his description of the early stage of the affection, and represents a condition in the large bowel known by the name of pellicular or diphtheritic colitis, which occurs sometimes as an idiopathic affection, but more frequently is secondary to some other disease. I find no mention in any of the works at my disposal of the large rupia-like masses of exudation scattered singly and in rows upon the mucous membrane.

Several of the autopsies suggested a practical point of much importance, viz., the propriety of bleeding in cer-

* Transactions of the Pathological Society of London, Vol. viii. p. 66.

tain cases. Thus, for example : A young man, aged 20, full-blooded, died of pneumonia on the 5th day. At the autopsy, right heart and venous system gorged. Left lung uniformly solid, in a condition of red hepatization, its tissue dry, containing but little blood ; right lung in a condition of acute œdema, the surface on section bathed with bloody serum. Death most probably resulted from the vain effort of the right heart to send a certain volume of blood through an area of pulmonary capillaries reduced one-half by disease ; in consequence the blood pressure was nearly doubled in the normal capillaries, transudation of serum under the increased lateral pressure occurred and a suffocative œdema terminated the case. The reduction of the volume of blood by a copious venesection would have restored the natural equilibrium between the circulating fluid and the pulmonary capillaries ; just as nature gradually adjusts it in the case of a consumptive, with more than one-half of these capillaries destroyed.

Gangrene.

CASE XII.—*Phthisical cavities in left lung ; gangrene of pulmonary tissue about one of them.*

H. L., æt. 38.

Lungs.—Occupying the back part of the left lung at the middle third of the upper lobe is an area of gangrene, the size of a large orange. It is situated immediately beneath the pleura, and was perforated by the finger in the removal of the organ. On section it is found to consist of dark, exceedingly fœtid, decomposing lung tissue, which, after pouring a stream of water upon it, adheres to the vessels and bronchi as irregular shreds. The lung in the immediate neighbourhood is consolidated, and several small cavities and caseous nodules are present in the other lobes.

Bronchial tubes contain an offensive mucus, and the membrane is very dark-coloured.

Phthisis.

Of twelve cases, three only are worthy of notice.

CASE XXXVIII.—*Fibroid contraction and induration of entire right lung, cavity at apex. Displacement of heart; hypertrophy with dilatation of right chambers.*

For clinical history see *Can. Med. and Surg. Journal*, Feb. 1877.

Lungs.—Right, universally adherent, and removed with difficulty; organ firm, solid, and to the touch gives no indication of crepitation. On section no trace of the lobes remains. A large cavity occupies almost the entire apex, situated chiefly in the antero-lateral region, the posterior wall being composed of irregular fibroid masses through which two or three large bronchi open directly into the cavity. The upper and antero-lateral walls are made up of a layer of fibrous tissue 1-2" in thickness, the outer part white, the inner portion darkly pigmented. Two irregular prolongations from this cavity extend downwards and forwards towards the anterior margin of the lung, and another narrow one extends for two inches along the posterior part of the organ, immediately beneath the pleura, which is here thin. The lining membrane of these cavities is dark red in colour, and traversed by numerous bands, the remnants of bronchi and blood-vessels. The base of the organ is firmly united to the diaphragm, and the portion which is received into the angle between this membrane and the ribs is, for the extent of 1½", transformed into a mass of white fibroid tissue, devoid of any trace of lung substance. Between the upper margin of this fibroid area and the cavity at the apex—a distance of 3"—the lung presents a marbled appearance, is dense, firm, and with the exception of one small spot close to the root, airless; a few small dilated bronchi are evident below, while immediately beneath the pleura are one or two inconsiderable cavities filled

with a bloody and purulent matter. The anterior border of the organ is in the same condition, and on section numerous small cavities (some of which are dilated bronchi) with bloody contents are seen. The organ is not excessively pigmented. The main bronchus and its branches of the 2nd and 3rd degree are somewhat dilated. Bronchial glands firm, not enlarged, moderately pigmented.

Left lung adherent at the apex only. On section a large irregular cavity with thick dense walls occupies the upper and anterior part of the apex, the lining membrane of which is hæmorrhagic. The remainder of the organ is extensively emphysematous, especially at the anterior border, but presents no other degenerative signs.

Heart.—The cavities of the right side much dilated and full of blood, walls of right ventricle appear somewhat thickened. Tricuspid orifice dilated, admitting four fingers nearly to the second joint. Segments of the valves a little thickened at the edges. Musculi papillares look elongated and the apices are fibroid.

CASE LXXXI.—*Chronic phthisis.—Perforation of the lung—Pneumothorax. Dermoid cyst of right ovary.*

J. S., æt. 21.—On opening the abdomen the liver is seen to be displaced downwards, the upper border corresponding to the lower margin of the ribs. On penetrating the right pleural sac a considerable amount of air rushed out. 18 ounces of a clear, serous fluid in this cavity.

Lungs.—The left upper lobe is riddled with cavities; the lower lobe is slightly crepitant, and contains numerous caseous and tubercular nodules. Upper and middle lobes of right lung almost airless, except at free border; lower lobe collapsed. No adhesions except at extreme apex. The visceral layer of the pleura of lower lobe is covered with patches of lymph. At the upper and posterior part of this lobe, about an inch from the root of the

lung, and the same distance from the upper lobe, there is a small oval perforation, $2\frac{1}{2}$ " by $1\frac{1}{2}$ ", through which air bubbles on pressure. For a couple of lines about the orifice the pleura is pale; beyond this the membrane is injected and covered with recent lymph. The perforation does not lead into a definite cavity, but into a rapidly softening portion of lung, infiltrated with pus, and in parts quite diffuent.

CASE LXXXII.—*Chronic Phthisis. Cancer of the vertebrae and ribs.* Reported under Osseous System.

PLEURA.

Small fibroid thickenings on visceral layer.—In three instances localized fibrous outgrowths of the pleura have been noticed, much resembling miliary tubercles in size and general appearance. The first case in which they occurred was that of pneumonia complicated with meningitis, and the next with reference to them in the *post mortem* book is as follows: "Scattered over the surface of pleura of both lungs, chiefly of lower lobes, are small white, firm granules, feeling to the touch like small shot and resembling miliary granulations. Some of them however, are flatter, not granular, and they may be simple fibroid thickenings of the pleura." Such they proved on examination to be. They occurred in a case of cancer of the liver, though not so abundantly, on the pleura covering the left lung; and a third time on the pleura of the upper lobe of the left lung in a case of pneumonia. They are found chiefly on the interlobular tissue, sometimes as shot-like elevations on small opacities of the membrane.

These are of interest on account of the resemblance they present to miliary tubercles; so much so that an experienced pathologist seeing them in the first case, raised a question as to the nature, whether simple or tuberculous, of the meningitis accompanying it.

Inflammation.—Of fifteen cases in which the membrane was affected, thirteen were simple in character, and

accompanied with a variable quantity of exudation; the other two were cases of empyema.

In the following cases the effusion was enclosed in pockets, and though, for convenience, the chest was tapped, post mortem, the whole of the fluid could not be drawn off.

CASE LXVII.—*Pleurisy: Fatty and fibroid Heart.*
A.B., æt. 63.

Right Pleura.—By tapping, about seven pints of clear citron-coloured fluid were withdrawn. On removing the sternum a definite pocket is found from which the fluid had been removed. The upper wall of the cavity is formed of a layer of tenacious lymph. Another smaller pocket exists in the upper and back part of the pleural cavity.

CASE LXXXVIII.—*Suppuration of portal vein. Empyema.*
A. B., æt. 40.

Left Pleura.—About 54 oz. of pus in this cavity. Anteriorly it is contained in two pockets, one the size of a large orange immediately at the apex, the other corresponding in position with the third and fourth ribs, just external to the cartilages. This latter pocket communicates by a small round orifice with the general cavity, which occupies the lower and whole of the back part of this side. The pus was withdrawn from the latter without affecting in any way the contents of the cavity at the apex and not entirely emptying the other one.

GASTRO-INTESTINAL SYSTEM.

TONGUE.—*Epithelioma.*

CASE XLV.—*Epithelioma of right side of Tongue, extending from base to near the apex. Removal of organ with galvanic ecraseur. Suppuration beneath cervical fascia. Pyæmia.*
J. L., æt. 36.



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The tissues of the neck behind the deep fascia, principally on the right side and in front, are uniformly infiltrated with pus, which extends also to the anterior mediastinum. There is no definite collection of pus.

Lungs.—Left, healthy looking. Middle and part of the upper lobe of right are firm to the touch, non-crepitant, and the surface section is bathed with a sero-sanguineous fluid. A small purulent focus exists at external part of middle lobe, not an accumulation of pus, but an area 1" by $\frac{3}{4}$ ", irregularly infiltrated.

CASE XLII.—*Epithelioma of Tongue. Secondary nodules in liver.*

A. B., æt. 72.—Tongue almost entirely eaten away by the cancer, the base only remaining. The tissues in the neighbourhood are involved and the internal surface of the lower jaw on both sides is much eroded. Epiglottis and larynx not affected. The *liver* contains three masses of secondary cancer, the largest the size of a horse chestnut, situated superficially and presenting the usual characters of these growths.

The *lungs* present caseous masses at the apices. *Heart* somewhat atrophied. *Spleen* very small, weighing scarcely two ounces.

PHARYNX.—*Miliary Tuberculosis.*

CASE LXXX.—*Chronic Phthisis. Miliary tubercles in lungs and pharynx.*

A. G., æt. 22. *Lungs*: upper lobes riddled with communicating cavities, one of which, the size of a small egg, is filled with a clear, somewhat viscid, jelly-like material. Numerous tubercles and caseous nodules in the lower lobes.

Pharynx.—Scattered over the posterior and lateral walls are numerous, small, firm, granulations, which on examination prove to be miliary tubercles. They are con-

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lined to the pharynx. There is no ulceration and the larynx is not involved. With the exception of two suspicious spots in the cortex of the right kidney, the other organs are unaffected.

In another case of chronic phthisis the same condition of the pharynx was observed, and without ulceration.

These cases are of interest as showing the existence of extensive miliary tuberculosis in the pharynx without ulceration, and without involvement of the larynx. The condition is by no means common in phthisis. Attention has recently been directed to this subject in an able article by Fränkel.*

ŒSOPHAGUS.

Post-mortem digestion.—In CASE LXIX, a man dead of Typhus fever, an oval perforation of the œsophagus at the posterior wall, just above the diaphragm, was found. It extended $1\frac{1}{2}$ " in length by $\frac{1}{2}$ " in breadth; the edges thin, dark in colour, not at all congested. A small amount of fluid was in the tissues of the posterior mediastinum. The stomach contained semi-digested food, and its mucous membrane was softened.

STOMACH.—Cancer.

CASE XXIV.—*Cancer of the cardiac orifice, involving the œsophagus. Secondary masses in other parts of the organ.*

M., H., æt. 52. *Stomach.*—The cardiac orifice is blocked by irregular cancerous projections from the mucosa, so that the tip of the forefinger is with difficulty introduced. The growth appears as an annular ring, extending for about an inch above and below the orifice. The walls are here much thickened, and the distinction between the coats lost; the surface of the cancer is much ulcerated. For a distance of an inch or more the mucous membrane

* Ueber die Miliartuberculose des Pharynx. "Berliner Klin. Wochenschrift," Nos. 46 and 47, 1876. (See CAN. MED. AND SURG. JOURNAL, Feb. 1877).

of the lesser curvature appears healthy, but between this and the pylorus is a long, flat, cancerous mass, not ulcerated. A string of projecting nodules extends along the greater curvature, and on the posterior wall is a thick, flat mass beginning to ulcerate on the surface.

The growth corresponds in histological characters with medullary cancer. No secondary masses in any other organ.

CASE LXII.—Medullary Cancer, involving the pyloric zone of the stomach. Perforation, peritonitis.

F. M., æt. 33, had had for some time indefinite gastric symptoms, accompanied with occasional attacks of vomiting. There was no tumour to be felt externally. He left the hospital, to return a short time after in a condition of collapse.

Abdomen.—Intestines of a bright red colour and covered here and there with flakes of lymph. The omentum is pushed up and lies beneath the costal cartilages. On separating the transverse colon from the stomach, a round perforation about the size of a sixpence is seen in the latter, through which the contents escape.

Stomach.—On opening the organ a large, irregular, cancerous mass, about $2\frac{1}{2}$ " in width, extends around the pyloric zone, but does not involve the orifice. In the centre of this, corresponding to the lower and anterior part of the greater curvature, is a round perforation, the margins of which are thin and of a dark colour. The cancer is moderately firm, much raised, the surface ulcerated, especially at the lesser curvature. Though it contains a considerable proportion of fibrous elements, yet the general character of the growth corresponds rather with the medullary form of cancer.

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SMALL INTESTINE.—*Incarceration.*

CASE XCII.—*Passage of two feet of the ileum through a loop attached to the sigmoid flexure.*

M. H., æt. 50, taken ill suddenly with vomiting and symptoms of obstruction, which continued 48 hours, when she died unexpectedly in a condition of coma.

On opening abdomen, a small amount of bloody fluid is found in peritoneal cavity. The intestines are slate-coloured, relaxed, smooth, and present no sign of inflammation. On tracing them towards the cæcum it is found that the lower two feet of the ileum have passed through a loop attached to the sigmoid flexure and have become strangulated, being very dark, in places almost black, as if necrosis of the part was beginning. Careful examination of the constricting band shows that it is connected by both ends with the sigmoid flexure, and is composed of fatty and fibrous tissue, in structure looking very like the glandulæ epiploicæ near it. At its upper part, and near the attachment, it is broad, but the part farthest from the large bowel is exceedingly thin. The intestine passes through on the side of the ring next the sigmoid flexure, the lower end of the ileum being uppermost, and nipped about $1\frac{1}{2}$ " from the ileo-cæcal valve. The mesentery passes through on the right side, and at and about the constriction is very dark. The diameter of the ring is about an inch. It is remarkable that though the strangulated portion of the bowel was dark and congested, yet there were no signs of inflammation, nor any lymph upon the peritoneum.

Nothing abnormal in other organs.

Ulceration—Simple.

CASE XCI.—*Round ulcer of duodenum.*

M.G., æt. 12, dead of bronchitis and pulmonary collapse. About $1\frac{1}{2}$ " from the pylorus, on the posterior wall

of the duodenum, is a distinct ulcer the size of a three-penny bit, with slightly raised edges, lying between two valvulae conniventes.

Nothing else abnormal in the intestines.

In two instances—one a case of grey degeneration of the cord, the other a case of cancer of the uterus—there were simple round ulcers in the ileum.

Typhoid Ulceration and Perforation.

Of seven autopsies in typhoid fever the following are of interest:—

CASE II.—Perforation of typhoid ulcer during convalescence, owing to an indiscretion in diet.

A. P., æt. 18, a convalescent for nearly two weeks, during which time the temperature had been normal. A day or two before his intended discharge he ate several mutton chops, and within 24 hours was in a state of collapse from perforation.

Abdomen.—Coils of small intestine of a rose-red colour: several pints of a dirty fluid, mixed with fecal matter, in the peritoneal cavity. A few flakes of lymph on some parts of the ileum, but the congestion is confined to the coils near the abdominal walls. On carefully examining the intestines a small perforation is seen, situated about eight inches above the valve, and through it fecal matter exudes. On slitting up the ileum the perforation is found at the bottom of an ulcer about the size of a copper. It is button-hole in shape, 4''' in length, 2''' in breadth, and looks like a small transverse rent in the muscular coat. There is no inflammation about the ulcer, but it and the others in the bowel appear to have been healing.

CASE XXVIII.—Perforation of a deep ulcer at end of second week.

A. B., æt. 40, had been ill with typhoid fever two weeks; symptoms of peritonitis 18 hours before death.

Abdomen.—Intestines of a vivid red colour, and the general peritoneum inflamed. On carefully working down the coils from the duodenum, no lymph or adhesions are met with until the ileum is reached; on tracing it towards the pelvis, the coils are found matted together and covered with thick greyish-yellow lymph. About a foot from the valve a perforation is seen, fluid feces of a yellowish colour flowing out, so revealing it.

Intestine.—On slitting up the jejunum and ileum the mucous membrane is found pale, and in the lower two feet of the latter there are six or eight round, deep ulcers, the largest, about the size of a shilling, presenting an irregular perforation. The mucous membrane about the ulcers is not injected, nor are their edges raised.

CASE XCIII.—*Typhoid Fever. Perforation. Peritonitis.*—J. E., æt. 29. In hospital 9 days.

Peritoneum.—Coils of intestine present a vivid red appearance, being covered here and there with flakes of lymph, and stained with fecal matter. Nearly two pints of a dirty semi-feculent fluid in the cavity. About twelve inches from the valve a perforation is seen.

Intestine.—As the lower part of the ileum is approached there are several ulcers, most abundant in the foot of gut above the valve. Most of these are small and round, not elongated, and have yellowish-stained sloughs adhering to them which, with few exceptions, are only beginning to separate. About a foot from the valve is an ulcer, the size of a shilling, which has perforated. Near the valve are six or eight round, punched-out ulcers, the bases of which are formed by the muscular coats of the intestine. No ulceration in the cæcum or colon.

The following also present features of interest, as showing what a slight amount of intestinal disturbance may accompany fatal cases :

CASE XXXIII.—*Four round ulcers in the ileum. Peyer's patches not generally involved. Slight hypostatic pneumonia.*

A. B., æt. 24, a small, feebly developed man. In hospital 8 days.

Intestines.—Several intensely black patches, quite superficial, on peritoneal surface. Mucous membrane of jejunum covered with a flaky, yellowish matter, very closely adherent, and washed off with difficulty. In the ileum, five inches from the valve, there is a somewhat elliptical ulcer, placed rather transversely to the axis of the gut, and about the size of a penny. The base is made up of the circular fibres, and the edges are neither elevated nor congested. Two other smaller ones are situated close to it, and five inches higher up is a fourth, also small, and having a punched-out appearance. The patches above this are not elevated, but have a peculiar mahogany-brown colour, and on close inspection the individual follicles are seen to be a little swollen. The solitary glands are scarcely visible. No ulceration in the large bowel. *Mesenteric glands* moderately swollen.

CASE XXXIV.—*Slight swelling of Peyer's glands, only one small spot of ulceration.*

J. G. æt. 40, a stout man, of intemperate habits. In hospital five days. Temperature moderate, and general symptoms not bad; he had no delirium, but was excessively timid and nervous, so much so that the House Surgeon expressed the belief that he was frightened to death.

Intestines.—Peyer's patches slightly swollen, their bases congested and the follicles in each very distinct. The solitary glands in the neighbourhood of the valve are enlarged. In only one small patch, about a foot from the end of the ileum, is there any trace of ulceration, and on this it is not at all advanced. No affection of the large intestine.

Mesenteric glands a little swollen.

Spleen weighs 15 oz., and is very soft.

Heart.—Right and left segments of aortic semi-lunar valves have merged together, presenting one sinus behind, with an indistinct separation near the attachment to the aorta. Segment a little thickened, but valve appears competent.

CÆCUM.

CASE XXXII.—*Round ulcer of cæcum, perforation, general peritonitis.*

M. G., æt. 19, a well-built young man. In hospital 4 days and a half, with symptoms at first like obstruction of the bowels, subsequently those of peritonitis. Three weeks before he had an attack of what was supposed to be strangulation, from which he recovered.

Abdomen.—General peritoneal surface much inflamed, and of a deep-red colour. On separating the coils of small intestine patches of lymph are met with, uniting them together. A pint of fluid in the cavity. The intestines are swollen and distended, the walls soft and tumefied. The inflammation is much more extensive toward the pelvis and in the neighbourhood of the ileo-cæcal valve. Evidences of a bygone peritonitis are seen in the form of slight opacities and puckerings on the serous surfaces, both visceral and parietal.

Small Intestine.—Mucous membrane tumefied; otherwise unaltered.

Cæcum.—The inflammation about it is most intense, and the lymph most abundant. On carefully separating it a round patch, $2\frac{1}{4}$ " in diameter, is seen on the abdominal parietes, of a greyish-red colour, and somewhat depressed. Corresponding to the centre of this is a round perforation of the cæcal wall, $1\frac{1}{2}$ " in diameter, the coats of the intestines about it being much inflamed. On slitting up the gut a single ulcer, which has perforated, is seen on the upper and outer wall; its edges are thin, and the mucous

membrane about much inflamed. Nothing else noticeable in the large intestine.

Remarks.—Perforation of the cæcum is rather an unusual accident, much more so than perforation of its appendix. In this case the trouble probably originated in an attack of the *typhlitis stercoralis* of Rokitansky, induced by the lodgment of hard masses of fæces. There were evidences about the perforation, between the cæcum and iliac fascia, of inflammation (perityphlitis) of an older date than the general peritonitis; and there can be no doubt that it was in the first illness that the perforation happened, its evil effects being limited by a local inflammation, which subsequently, owing to some not ascertained cause, spread to the general peritoneum. There was a very marked contrast between the area of inflammation immediately about the perforation and that towards the head of the cæcum; the former was darker, more greyish in colour, and the contiguous surfaces were not so easily separated. It is important to note, with reference to the diagnosis, that the symptoms appeared to point to obstruction of the bowels; doubtless, a more thorough inspection would have satisfactorily decided the question.

APPENDIX VERMIFORMIS.

In three cases there were found in it firm concretions of fæcal matter, oval in form, and about the size of date stones. In Case xxviii., mentioned above, its calibre was obliterated for the first half inch of its length, patent for an inch beyond the obliteration. In another case of typhoid fever, it was also partially closed. It was ulcerated in a case of phthisis, chiefly at the cæcal end, which was almost entirely closed by the swelling of the membrane, in consequence of which the tube was dilated with the retained secretions, being nearly the thickness of the thumb.

The following is the only instance of perforation noticed :—

CASE LXXXVIII.—*Abscesses in the mesentery. Suppuration of portal vein. Empyema. Perforation of appendix, general peritonitis.*

J. L., æt. 42. Had had typhoid fever three months previously.

Abdomen.—General peritonitis; 80 oz. of turbid fluid removed; intestines covered over with thick yellow lymph, most abundant on the coils of the ileum and on the pelvic organs.

The *appendix* lies directly over the promontory of the sacrum, and is about the length and size of the index finger. It is much swollen, and the walls soft. On carefully removing it the fluid contents escape from an oval perforation on the under side, which is adherent to the tissues over the sacrum by thick lymph. On slitting up the cæcum, which is healthy, a probe cannot be passed into the appendix, nor can its orifice be seen. From the side of the latter the probe enters a small sulcus which passes for two or three lines beneath the mucous membrane of the cæcum. About $1\frac{1}{4}$ " from the cæcum is a round perforation, $\frac{1}{3}$ " in diameter, the margins thin and dark-coloured. There is no foreign body or concretion.

PERITONEUM.

Acute Inflammation.—In eleven cases of acute peritonitis, the following were the causes:—Three, perforation of typhoid ulcers; one, perforation of cancer of stomach; one, perforation of cæcum; one, perforation of appendix vermiformis; one, rupture of an abscess in broad ligament; two followed the operation of ovariectomy; one, cancer of the liver; and one followed delivery in a woman with Bright's disease.

Tubercular Peritonitis.

CASE VII.—*Acute tubercular inflammation of the peritoneum. Small caseous mass in left lung.—Right-sided pleurisy. General hyperplasia of the bone marrow.*

J. McT., æt. 35.—Had been a soldier for twelve years, latterly a sailor; admitted in September, 1875, complaining of weakness, loss of appetite, and frequent attacks of vomiting. No albumen in urine. Blood normal. Systolic murmur at apex. No enlargement of abdominal organs. Tenderness on deep pressure along right costal border and ensiform cartilage. The vomiting became more marked, and he had occasional attacks of diarrhœa. The symptoms pointed, though vaguely, to disease of the stomach, either round ulcer or cancer. The vomiting was with difficulty controlled, and patient became very weak and anæmic, the skin slightly icteric. Towards January he got so feeble that he was unable to move from bed, and the vomiting was so persistent as to necessitate feeding per rectum. Through January and February the vomiting diminished, but the patient wasted slowly, and the case was regarded as malignant disease, involving perhaps the peritoneum. In the beginning of May the peritonitis became acute and general, and he died on the 25th, profoundly exhausted. For some weeks before death hæmorrhages occurred in various parts of the skin.

Peritoneum, contains 56 oz. of a turbid, slightly bloody fluid, in which are flocculi of lymph. Here and there the coils of intestines are matted together by easily separable adhesions. The transverse colon and stomach are in this way glued together, the former covers also the anterior border of the liver. The entire peritoneum, except the portion over the stomach, is of a dark red colour, infiltrated, sodden, and readily stripped off from the sub-jacent tissues. Localized patches of lymph occur here and there upon it. The whole membrane presents a great

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number of small white areas, flat, not projecting above the surface, and ranging in size from a hemp seed to a split pea. As a rule they are isolated, but occasionally groups are seen. They exist in about equal numbers over the intestines, mesentery, and parietal peritoneum. Beneath the latter are from eight to ten larger white patches, which, on section, have a caseous appearance, are firm to the touch, not encapsuled, and extend to the depth of about $\frac{1}{2}$ ". On examination of these small and large white masses, they are found to be almost entirely subperitoneal and composed of aggregations of corpuscles of a lymphoid character, a little smaller than the colourless blood corpuscles, and with one, rarely two, nuclei. In sections through those on the intestinal wall, the corpuscles are seen to infiltrate to some extent the muscular coats. The mesenteric glands are but little enlarged.

Heart; ecchymoses on pericardium, walls flabby, muscle pale, very little blood in the chambers.

Pleura; 35 oz. of turbid fluid in right sac. Visceral and parietal layers congested, and covered with flakes of lymph. A few ounces of fluid in left sac.

Lungs.—Right, crepitant, except at extreme base. Lower lobe collapsed. Organ contains a good deal of serous fluid. Left, upper lobe crepitant, lower collapsed and œdematous. At anterior border of upper lobe is a firm block of condensed tissue, somewhat triangular shaped, which on section is made up of a small cavity, looking not unlike a dilated tube, and one or two caseous knots, the lung for a short distance about being solidified, and of a greyish colour. No miliary tubercles in either lung.

Spleen, weighs 5 oz., unaltered.

Liver, 2lbs. $2\frac{1}{2}$ oz., anæmic, and yellowish in colour.

Kidneys, normal in size, but very firm in texture. In the cortex of the right are several small purulent depots, about which the substance is much congested.

Stomach.—Mucous membrane of normal thickness, but soft and readily torn. No trace of cicatrices or tumour. It contains about a pint of fluid.

Small Intestines contain yellowish liquid faeces; walls are thick, owing to an infiltrated, swollen condition of all the coats. Mucous membrane is dark in colour. Peyer's glands not enlarged.

Large Intestine contains large masses of yellowish solid faeces.

Brain presents nothing abnormal.

Medulla of bones.—That of the long bones has a uniform greyish-red colour, nowhere having the yellowish fatty aspect of normal marrow. In the cancellated portions and short bones it has a lighter red colour. On examination there were, (1), red-blood corpuscles, presenting considerable differences in size, some hardly the $\frac{1}{3000}$ " in diameter, and many curiously irregular in form. (2) Ordinary marrow cells, and lymphoid corpuscles, which together with the blood corpuscles constitute the chief mass of the tissue. (3) Nucleated red-blood corpuscles—the embryonal or transitional forms of Neumann, of which in each specimen examined four or five examples were met. They are larger than the ordinary coloured forms and have usually a single nucleus. The colouration of these corpuscles is nearly, if not quite, as marked as in the ordinary forms. (4) Cells containing red-blood corpuscles, of which a few examples occurred. There are no myeloplaques.

Clinically, as well as pathologically, this case presents many points of interest. The prolonged gastric irritation, which was the prominent symptom during the first five months of his illness, receives no suitable explanation in the condition found post-mortem. Are we to suppose the peritoneal trouble to have begun with the onset of the symptoms in September, or were these latter due to some constitutional dyscrasia, upon which the affection of the

peritoneum was grafted, dating only three weeks before death, when symptoms of acute inflammation of the membrane developed? Certain cases of tubercular peritonitis are notoriously obscure, the symptoms pointing rather to disease of some viscus covered by the peritoneum, as the bladder or intestines, than to an affection of the membrane itself: and in this case the gastric trouble may have been caused by the chronic irritation induced during the gradual eruption of the tubercles. The condition, however, at the time of death was rather one of acute peritonitis, as evidenced by the injected and tumefaction of the coats of the intestines, and there was nowhere that matting of the coils together by firm adhesions and tubercular matter which is seen in many cases of chronic tubercular peritonitis; but it is a question whether the recent inflammation may not have been super-added on a membrane already studded with tubercles, though with the exception of the large masses on the parietal peritoneum, they did not look very old.

The anæmia and wasting, together with the gastric irritation, presented a clinical picture, not unlike certain of those constitutional affections dependent upon some profound alteration in the constitution of the blood, such as pernicious anæmia; and the finding *post-mortem* of a condition of hyperplasia of the bone marrow, I at first regarded as lending support to this view, seeking in it the explanation of the deterioration of the blood; for there can be no doubt that alteration in the medulla of the bones may seriously influence the composition of this fluid. Moreover, the peritoneal affection was not what I had been accustomed to see in tubercular conditions of this membrane, for, with the exception of the large masses on the parietal layer, the tubercles were not firm and nodular in character, as is usual with these growths on serous membranes, but had rather the appearance of localized lymphoid infiltrations. Since the occurrence of this case,

however, two other instances of hyperplasia of the bone-marrow in chronic wasting diseases have come under my notice, so that I am now less ready to refer this one to the category of myelogenous affections, but would regard it rather as a case of tubercular peritonitis, latent in its course, and towards the end accompanied by an acute inflammation of the membrane, the consequence probably of a fresh outbreak of tubercles.

The absence of the tubercles in the other organs is a condition which not unfrequently obtains in this affection.

LIVER.—*Hypertrophic Cirrhosis.*

CASE 1.—*Cirrhosis of Liver, with enlargement.—Jaundice. No Ascites.—Delirium Tremens (?)—Erysipelas of the head.*

J. H., æt. 34, intemperate habits, admitted to the Hospital April 30th, 1876, with jaundice, diarrhœa, and delirium. He had been seen by Dr. Roddick a few days before, when he complained of pain in the region of the liver, and great enlargement of the organ was then detected. Nothing definite could be obtained as to the duration of the jaundice, for he was incoherent, and had no friends. Shortly after admission he was attacked with erysipelas of the face and scalp, to which he succumbed rapidly on the 4th of May.

At the autopsy the body was found to be well nourished and of fair muscular development. Skin moderately jaundiced. Several purpuric spots noticed.

Brain.—Healthy.

Abdomen.—No fluid in peritoneal cavity. Liver projects considerably below the margin of the ribs.

Thorax.—No fluid in pleural cavities. A few extravasations on the visceral leaves.

Heart.—Slight thickening of the mitral segments and some atheroma at the bases of the aortic semi-lunar. Otherwise healthy.

Lungs.—Crepitant, except lower lobe of left lung, which is collapsed.

Spleen.—Weighs 19 oz., (538.46 grammes). Capsule a little thickened and puckered. Pulp soft.

Kidneys.—Right, $9\frac{1}{2}$ oz.; left, 8 oz., of a greenish-yellow hue. Collecting tubules of the pyramids full of urates and bile pigment.

Stomach.—Contains $\frac{3}{4}$ vi of semi-coagulated blood. Mucous membrane dark-coloured, swollen in places and congested.

Intestines, dark, and contain a small quantity of altered blood. Large veins not particularly full, but the mucous membrane is reddened.

Liver weighs 6lbs. $11\frac{1}{2}$ oz., (3053 grms), and is uniformly enlarged. No adhesions, or fibroid thickenings in capsule. Surface of organ of a dark olive-green colour, and studded with small granulations, half the size of a pea and larger. These little projections have a greenish-yellow appearance, while the intervening tissue is white. On the under surface of the left lobe the largest nodules are seen. The organ is very firm, and cuts with resistance, the surface of section presents a deep, greenish-yellow colour, while the lobules are separated by strands of white connective tissue. The portal vein is large, appearing even dilated.

The gall-bladder is elongated, filled with inspissated bile, which towards the orifice of the cystic duct has collected into three consistent but easily broken balls, which completely close the orifice. The mucous membrane of the ductus communis choledochus is somewhat swollen, but the bile ducts do not appear to be dilated.

Microscopic appearances.—Sections under a low power present islets of liver substance surrounded by a connective tissue rich in nuclei, which in most of the specimens examined almost equals in amount the liver substance. The limit between these two elements is rarely well defined, but there is a gradual blending of the one

with the other. In certain lobules the invasion is uniform and intercellular, groups of two or three cells being separated by a nucleated growth; but in most the invasion is peripheral, and lobules in all stages of destruction may be seen, with the liver cells in the central parts still in close contact with each other.

The *connective tissue* differs in no respect from that seen in ordinary cirrhosis, save that the nuclei are perhaps more abundant in proportion to the fibroid tissue. Only in the central parts of wide areas is there an indistinctly fibrillated appearance, and here the nuclei are scattered, while in the neighbourhood of the lobules themselves the tissue is more embryonic in character, and the nuclei predominate, in some spots being crowded together with little or no intervening material. The method of invasion can be traced in all its stages, the new growth creeping in, as it were, from the periphery between the cells, sometimes separating them in rows, but frequently surrounding individual cells or groups of two or three. This appearance will, of course, vary with the direction of the section; if at right angles to the central vein of the lobules the appearance is of fibrous bands passing in from the periphery, while if parallel to the central vein, cells, or groups of them, are separated by an intervening tissue, rich in small nuclei. Such is the condition of the external zone of most of the lobules. There is no definite limit between the two constituents, such as is commonly seen in the atrophic form of the disease, where strands of fibrous tissue encircle and constrict lobules, and the boundary between the two is often, as in specimens before me, clearly defined. This was rarely to be found in the case under consideration.

The *liver cells* do not present any remarkable alterations. In lobules not much involved in the sclerosis, they appear quite natural, but in the affected areas they are stuffed with yellow pigment grains or oil drops, frequently a

combination of the two. The fatty infiltration is not extensive and is very unequally distributed, being marked in some lobules and absent in others. In the periphery of the acini, cells in all stages of atrophy may be seen, some appearing flattened, but the majority look simply diminished in size. Where the central part of a lobule, containing 40 to 50 cells, alone remains, the whole process can be distinctly traced. In the outermost part little groups of yellow granules are seen in the fibroid tissue, in the next zone small cells filled with these granules occur, separated by numerous nuclei, while in the central part are 10-15 cells, the outlines of which are still distinct, the nuclei well marked, and the bile pigment not so excessive in amount. In various sections numerous fine specimens of bilirubin crystals occurred, scattered among the cells.

Here and there in the extra-lobular tissue *biliary canaliculi* are seen, made up of rows of cuboidal cells, enclosing a very narrow tube. They do not appear to be specially numerous, certainly not more so than in sections of a well-marked specimen of atrophic cirrhosis obtained a short time since from the body of an old toper.

The recognition of a distinct variety of cirrhosis of the liver accompanied with enlargement, has only been made within the past few years, owing in a great part to the labours of certain French Pathologists. When the specimen came under observation it appeared to be such an anomaly that the standard authors were ransacked for information, but in vain; the only references to an increase in volume of the organ in cirrhosis related to the initial stage of the disease and as a consequence of fatty infiltration. Happily, just at the time, a number of the *Revue des Sciences Médicales* came to hand, with a condensation of M. Hanot's Thesis on Hypertrophic Cirrhosis, in which he seeks to establish this as a special variety of the disease, characterized clinically by enlargement of the

organ, prolonged jaundice, and the absence of ascites, and pathologically by the fact that the affection originates about the bile ducts, and leads to an increase, not a diminution, in the size of the organ. Cornil and Ranvier* describe the histological condition, and support this view of the origin of the disease. In a recent number of the *British and Foreign Medico-Chirurgical Review*† there is an excellent *resumé* of the papers on the subject, and the writer agrees in the main with Hanot.

The chief histological differences between this and the common form of cirrhosis appear to be that the growth surrounds single lobules rather than groups of them, and tends more to invade the acini, and that greater numbers of the so-called biliary canaliculi are found in the extra-lobular connective tissue. As will be seen in the above description, the first of these characters is well marked in our specimen, but the second is not so decided.

The clinical history of the disease in this instance, so far as known, corresponds with that of the cases recorded by Hanot. The liver exceeds in weight any of the specimens mentioned in the authorities referred to.

Syphiloma.

CASE V.—*Syphilitic ulceration of left frontal bone. Large node on left tibia. Gummata in Liver.*

T. M., æt. 24, admitted May 4th, with syphilitic disease of frontal bones, and died of erysipelas of the head on the 16th.

Liver weighs nearly 5lbs., and is elongated in the transverse direction. Left lobe much flattened, measuring 8" from anterior to posterior border, the right lobe at the gall-bladder measuring only 6". Capsule much thickened, especially about the longitudinal ligament. Five pucker-

* "Manuel d' Histologie Pathologique," p. 922.

† July, 1877.

ed cicatrices are seen on surface of the right lobe, and some small extravasations exist beneath the capsule. On section of the organ from right to left three gummata are seen in the substance, each about the size of a large walnut, two corresponding to cicatrices in right lobe. Each presents a firm, white, central area, which cuts with resistance, and a capsule of fibrous tissue, which towards the liver substance is not well defined, but blends insensibly with it, and at this part is more translucent. Four others presenting similar characters are seen; two, the smallest, in the left lobe. Microscopically the central portions show an indistinctly fibrous appearance, at the periphery the fibres are more marked, while the zone in the immediate neighborhood of the liver substance shows a small-celled growth involving the lobules.

The other organs presented nothing abnormal.

Cancer.

CASE LV.—*Primary Cancer of the Liver. Ascites. Jaundice—Secondary mass in tail of Pancreas, small secondary nodules in Kidneys.*

A. B., æt, 65, in hospital for several months. Body much emaciated. Abdomen distended. Skin moderately jaundiced.

From the peritoneal cavity 250 oz. of bile-stained serum were removed. Intestines slate coloured, and here and there small flakes of lymph are seen upon them. The descending colon passes down to about an inch and a half below the crest of the ilium, then turns and passes up upon the kidney nearly to the spleen, at which point it is firmly united to the omental tissue; turning again it passes obliquely to the lumbar vertebræ, descending in front of them and the sacrum to the anus. In the whole of its course it is closely attached. The ileum two inches from the valve is united by a firm band to the psoas muscle.

Liver.—Weight $4\frac{1}{2}$ lbs.; closely adherent to the dia-

phragm behind and at the right border, and also below to the tissue in the neighbourhood of the right kidney. Though somewhat smaller than natural the shape of the organ is maintained. The upper surface is exceedingly irregular, owing to the presence of numerous cancerous masses, a very large one much depressed in the centre being seen a little to the right of the longitudinal fissure, occupying an area fully three inches in diameter. Above the gall bladder there is another puckered spot, and numerous nodules exist in the liver substance about it. The whole of the surface to the right of the longitudinal fissure is involved in the disease, and the capsule here is thickened, opaque and fibroid. The posterior border is not so much affected, only here and there presenting isolated nodules. Where the longitudinal ligament is attached to the diaphragm there is an extensive, somewhat flattened, cancerous mass. The under surface of the right lobe is comparatively free, nodules being seen only at the anterior border. The lobus Spigelii presents a single deep puckering. Many elevated tuberos nodules exist in the under surface of the left lobe. All of these masses are raised above the surrounding liver substance, and the majority of them present cup-like depressions. A longitudinal section from right to left, through both lobes, shows the greater part of the liver substance to be the seat of disease. The large white mass noticed in the right lobe extends fully two inches into the organ, and innumerable small nodules are arranged about it. Quite three-fourths of the liver substance exposed on the section is occupied by the cancerous growth. The lower and posterior parts do not contain so many nodules. The hepatic tissue is very dark, and stained with bile; the central veins of the lobules are injected, and apparently dilated; a good deal of blood escapes from the larger veins.

The gall-bladder contains a small quantity of dark bile.

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A cancerous girdle surrounds the middle of the organ, and the fundus is also affected.

Nothing abnormal in the *heart* and *lungs*.

Kidneys.—Two small cancerous nodules the size of peas in the cortex of the left organ, and two others somewhat smaller in the right.

Spleen, small, and looks healthy.

Pancreas.—The tail is firmly united to the tissue in the hilus of the spleen, forming a firm, hard mass, about the size of a walnut, which on examination is found to be cancerous.

Stomach.—About 20 small, punched-out ulcers, with hæmorrhagic bases are seen on the mucous membrane of the fundus.

The *intestines* are dark in colour, the veins full, and the coats sodden.

The abdominal *lymphatic glands* are not enlarged.

The *left external femoral artery* contains a firm thrombùs.

The general character of the growth and the absence of any considerable mass of cancer elsewhere render it more than probable that the disease in the liver was primary. The presence of one large tumour, around which numerous smaller nodules are aggregated, is almost characteristic of primary cancer, the situation of which, however, is more commonly towards the under surface of the organ, and not, as in this case, just to the right of the longitudinal ligament. Though the weight of the organ was increased, its volume was decidedly diminished, an unusual circumstance in cancer, and one apt to lead, as I believe it did in the present case, to some confusion with cirrhosis.

Secondary Cancer.—Of three cases one followed cancer of the tongue, another cancer of the vertebræ and ribs, and in the third the primary lesion was in the gall bladder. The latter, a very remarkable case, is given in

detail by Dr. Bell, in *Canada Med. & Surg. Journal* for April, 1877. The pathological condition was as follows :

CASE LXXXIV.—*Cancer of neck of the gall-bladder and lymphatic glands in the portal fissure. Compression of the hepatic ducts. Secondary masses in liver. Enormous distension of gall-bladder and hæmorrhage into it.—Gall stones.*

Body that of a well-made, but spare woman. Skin intensely jaundiced ; conjunctivæ yellow. Rigor mortis absent.

Abdomen.—On opening this cavity a few ounces of slightly turbid and sanguineous fluid were removed. The liver is seen to be somewhat enlarged, and extends fully $3\frac{1}{2}$ inches below the margin of the ribs. Projecting from the under surface of the right lobe is an enormously distended gall-bladder, which reaches within two inches of the pubis. The upper surface is free, but to the left side it is attached by loose and somewhat fresh adhesions to the pushed up omentum and stomach. The apex, which is rounded, presents an irregular surface as if it had been attached, and on the side of the broad ligament, at a point a little to the right of the uterus, is a round space, covered on the surface with decolorized fibrin, hæmorrhagic below, which looks as if the gall-bladder had here been adherent. Behind it is firmly attached to the transverse colon. Traces of peritonitis in the form of thin flakes of lymph exist over the coils of intestines. An extravasation of blood has taken place into the tissues about, or rather upon, the peritoneum in the pelvic cavity, especially between the uterus and rectum. The corpuscles have subsided, leaving a pale yellow, fibrinous layer above, which is firm, and quite adherent to the surrounding parts.

Liver looks a little larger than normal, and is of a dark-greenish colour. Scattered over the surface are a dozen or more cancerous masses, white in colour, ranging in size

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from a cherry to a walnut, the larger of them with depressed centres. The anterior portion of the right lobe is separated from the rest of the organ by a shallow groove, the position of which on the body was just below the costal border. The left lobe is flattened, and its anterior margin notched. On section the liver substance is deeply bile-stained; the lobules are not very distinct. There are but few cancerous nodules in the interior. On opening the distended gall-bladder it is found occupied by a large coagulum, the upper part of which, owing to the sinking of the blood corpuscles, is decolorized. Hardly any serum is present except that contained in the meshes of the clot. Nine or ten gall stones, about the size of marbles, and with numerous facets are found. At the neck a small irregular mass of cancer projects into the cavity, and completely blocks up the cystic duct. The walls of the bladder are thin, not cancerous, and at the posterior part, just where the transverse colon is attached, there is a portion infiltrated with blood. On close inspection it is seen that ulceration and destruction of the wall has here taken place. There can be no doubt that by this process a vessel has been opened, and the hæmorrhage caused. The glands in the hilus of the liver are enlarged and cancerous, and compress the hepatic ducts. The portal vein does not appear to be interfered with.

Heart and Lungs, quite healthy; a few ounces of fluid in left pleura. Slight atheroma in aorta and aortic segment of mitral.

Spleen not enlarged, and of a deep brownish-red colour.

CASE LXXXVIII.—*Extensive abscesses in the mesentery, following typhoid fever. Suppuration of the portal vein and its branches in the Liver. Empyema. Perforation of the appendix vermiformis; Peritonitis: Miliary Tubercles in lungs. Amyloid degeneration of spleen, liver, and mucous membrane of small intestines.*

A. B., æt. 37. History of an attack of typhoid fever three months before, from which he had not entirely recovered, remaining febrile and very weak. Empyema supervened, and finally an attack of acute peritonitis. There was no jaundice, nor, so far as I can learn, did the symptoms point specially to any trouble in the liver.

Peritoneum, extensively inflamed and contains 80 ounces of turbid fluid. The inflammation is most intense about, and has evidently spread from, the appendix vermiformis, the caecal end of which is obliterated, while the under surface presents an oval perforation.

Pericardium and Heart healthy. Left pleura contains 54 ounces of pus. Left lung compressed and, with the exception of the apex, airless. Numerous miliary tubercles scattered through it. Right lung crepitant; one or two caseous nodules at the apex; miliary granulations abundant. *Spleen* weighs 330 grms., firm, Malpighian corpuscles enlarged, translucent, and re-act with iodine. *Kidneys* firm, pale, slight re-action with iodine in the right.

Ureters and bladder healthy. *Stomach* contains about a pint of greenish fluid; the mucous membrane is thin and soft. The *duodenum* is firmly adherent in its first part to the gall bladder, the tissues in the neighbourhood being closely matted together. On pressing the *common bile duct* a yellowish secretion first flows out, and is followed by pure pus. About an inch and a half from the pylorus, towards the upper surface of the first portion of the duodenum, pus is seen to exude from a round orifice the size of a pea. On passing a probe into this it is found to communicate directly with the enlarged and suppurating portal vein, to be shortly described. Mucous membrane of jejunum and ileum reacts on the application of iodine. Nothing abnormal in the *large bowel*.

The *mesentery* is enlarged, thickened, and the whole structure fluctuates like a sac of pus. Towards the root, and at some spots near the bowel, the fluctuation is limited, as if the individual glands were involved. On

section of the membrane, pus is found to spread uniformly between the folds, and, after thoroughly washing with water, it appears as if riddled by communicating cavities. In some spots the pus is limited within the capsules of lymphatic glands. On tracing the mesenteric veins from the intestinal border many are found to lead directly into these suppurating areas, others are shut off by thrombi. At the distal border, where the mesentery is cut away, close to the superior mesenteric artery, there is an irregular opening, from which pus flows, while a probe in it passes in several directions. Whether or not this represents the superior mesenteric vein it is difficult to say; the situation corresponds with it.

Liver, enlarged, firm to the touch, but at the same time yielding and elastic. On section the substance cuts with resistance, looks glistening, and on the application of iodine the intermediate zone of each lobule becomes a mahogany-brown colour, the central and interlobular areas remaining unaffected. On the surface of the organ, especially on the posterior and right borders are several small, irregular swellings, which on section are found to contain pus. The abscesses are tolerably numerous in these regions, and range in size from a pin's head to marbles. Many are in communication with each other, or are separated by narrow portions of liver substance. On closer dissection it is found that these abscesses stand in direct connection with, and indeed, are only suppurating portal veins. This having been ascertained, a thorough inspection of this vessel was undertaken. Outside the liver the vein is represented by an elongated abscess with thick, irregular walls, made up anteriorly of condensed connective tissue, posteriorly to a large extent by the head of the pancreas, the lobules of which have been laid bare in the suppuration. Immediately where the vessels enter the liver its calibre is relatively diminished. The *splenic* vein ends abruptly on the wall of the suppurating vessel, being

closed by a thrombus, while the portion behind is much dilated. Unfortunately, in removing the liver, duodenum, stomach and pancreas together, the mesentery was cut off just below the latter, and no trace could be found of the superior mesenteric vein and the manner of its communication with the portal. On passing a director along the branches of the portal vein and slitting them up they are found full of pus, sometimes cream-coloured, at others tinged with bile. The branch passing out to the right lobe of the organ, at about an inch from the hilus, widens into two large sinuses, one going to the right border, the other towards the posterior. Into these open numerous branches from which large quantities of yellowish creamy pus can be squeezed. Near the upper surface of the right lobe is a cavity of the size of a walnut, in communication with a vein, and from its upper end one or two branches are given off. The posterior border of the organ appears on section riddled with such cavities, which are found in every instance to be merely dilated branches of the vein. In the anterior portion of the organ over the gall bladder there is less disease than in other parts. The extreme left border is also unaffected, and the branch going to it does not contain pus. The lining wall of the suppurating vessels passes over abruptly into the liver substance, is firm, and of a peculiar yellowish-white colour. There is no zone of hyperæmia about the inflamed vessels, the hepatic tissue beyond the opaque white margin looks natural. In branches in which the suppuration is not far advanced, the remains of the intima, like a soft, stringy mass, can be seen, as if the process was confined rather to the adventitia and Glisson's sheath. On almost any section of the organ peculiar yellowish-white areas occur, very often of an irregular foliaceous appearance. Occasionally groups of them appear isolated, but on making a section through them they are always found to be in connection with suppurating vessels, the smaller ones being surround-

ed by one or two necrotic liver lobules of a glistening, opaque-white colour.

The first and second division of the vein passing to the hinder and right borders are considerably dilated, and on the lower wall the branches of the artery and duct are seen as elevated cords. The former at its commencement appears nearly double the usual size, and on the walls of all the larger suppurating veins its branches could be seen. The *common bile duct* is pervious and a probe can readily be passed into the hepatic ducts, which appear quite free from disease and contain bile. The cystic duct is also patent. At the junction of the cystic and hepatic ducts the sub-mucous tissue is greyish-white in colour, and the same condition extends along the former to the *gall-bladder*. This organ is large, somewhat distended, and contains about 3 oz. of laudable pus, not tinged with bile. The mucous membrane is transformed into a thick greyish-white structure, which is here and there congested. At the upper and back part of the opening of the cystic duct there is an irregular wide sinus leading towards the portal fissure, and along it a probe can be passed for $1\frac{1}{2}$ ", terminating close to the dilated and suppurating branches of the vein. A direct communication with the latter could not be made out, but water poured into the sinus oozed out in the vein.

All the parts about the head of the pancreas are closely adherent together, and there are several separate lymphatic glands in a condition of suppuration.

Lying along the left side of the lower 2" of the abdominal aorta, and extending another $2\frac{1}{2}$ " at the left of the left internal iliac and ending on the wall of the rectum, is a narrow shut sac, full of pus, the walls thick, dark in colour, and lined by a definite pyogenic membrane. There is no communication with the rectum, the walls of which at the point of attachment appear healthy, nor is there any opening at the upper end.

The right *vena azygos* is remarkably large and distended with blood, almost equalling in size the inf. vena cava. The left is also large.

Suppuration of the portal vein—pylephlebitis—is among the rare affections of the liver. Frerichs (1861), collected twenty-five cases, of which only three or four followed, as in this instance, suppuration in the mesentery; the others resulted from injury, ulcerative processes in intestine and stomach, abscess of spleen, &c. In the Pathological Society of London two or three cases have been presented up to the present time.

The remarkable combination of lesions met with in this case, and the absence of a proper clinical history, render it somewhat difficult to decide upon the starting point of the process,—the first link in the series. The typhoid fever may be regarded as the primary affection to which the suppuration in the mesentery and chain of retro-peritoneal glands was secondary; the pylephlebitis resulting probably from an extension of the inflammation in the mesenteric veins to the vena portæ and its branches. Another source of infection, however, was present, viz: the inflammation in the appendix vermiformis, which formed the starting-point of the disease in three or four of the recorded cases; but I see no reason in this instance to regard the ulceration and perforation of the appendix as anything more than an accidental occurrence, arising from obliteration of the orifice—probably the result of a typhoid ulcer—and retention of secretion. The fatal issue was due to the extension of the inflammation in the neighbourhood of the appendix to the general peritoneum. It is impossible to say, not having a clinical record, whether the empyema was a sequela of the typhoid fever, or of pyæmic origin resulting from the pylephlebitis, though it is remarkable to find how rarely pyæmic abscesses occur in this disease, being noted in only 5 out of the 25 cases collected by Frerichs. The

tuberculosis of the lungs was probably secondary to the empyema. A point of interest is the way in which the collateral circulation was established, though, unfortunately, owing to the length of time spent over the other conditions, no careful dissection could be made. The right vena azygos was greatly distended, and the left was also much larger than normal. The only distended veins observed in the abdomen were those about the hilus of the spleen, and the vasa brevia of the stomach.

SPLEEN.

Size.—The extremes occurred in a case of cirrhosis, in which the organ weighed $31\frac{1}{2}$ oz., and in a case of cancer of the tongue in an old woman, greatly emaciated, in which it weighed only $2\frac{1}{4}$ oz.

In seven fatal cases of *Typhoid fever* the extremes were 7 oz. and 19 oz.; both in cases of perforation, the former at the end of the 2nd week, the latter after nearly two weeks convalescence.

Albuminoid degeneration occurred under the following conditions:—cancer of vertebræ; syphilitic ulceration of frontal bone, with gummata in liver; tubercular nephritis; pyelophlebitis. In none was the enlargement very great.

Miliary tubercles were met with in three instances, one a case of general tuberculosis, the others chronic phthisis.

Fresh *infarctions* were found in a case of aortic valve disease, and in a case of Bright's disease during pregnancy. In the latter no affection of the heart could be determined.

The *capsule* in nine cases was thickened and fibroid, either in localized spots or over the whole surface. In one instance it was of almost cartilaginous character, and in another the localized thickenings were calcareous.

Small *supernumerary* spleens were met with in three cases.

GENITO-URINARY SYSTEM.

KIDNEYS.

Inflammation.—In two cases of death after lithotomy in old men these organs were extensively inflamed, though not in a condition of suppurative nephritis; one of them, case xciv (see below, under Bladder), the affection was limited to the apices of the pyramids, which were much involved and covered with a grey, diphtheritic-looking membrane.

Morbus Brightii. Of five cases two (xxix and xlvii), occurred in connection with pregnancy, death having taken place in the latter three weeks after delivery, in the former at the seventh month. They presented well-marked examples of the large mottled kidney, the organs weighing in both 10 and 11 oz. each.

Case lx was of special interest, but, unfortunately, the notes got mislaid and were not entered in the post-mortem book. It was an instance of chronic Bright's disease, with small contracted kidney, occurring in a girl aged 20, who had a well-ascertained history of an attack of scarlatina six or seven years before. The kidneys were reduced to about one-half the normal size, capsules firmly adherent, surfaces granular, substance very firm, cortices much diminished and the arteries very prominent. The heart was considerably hypertrophied, the left ventricle particularly so; no valve disease.

Tuberculous disease.—Miliary tubercles were met with in three cases of chronic phthisis, in three of general tuberculosis, and also accompanying the three following cases of chronic tuberculous nephritis.

I CASE XXI.—*Tuberculous disease of right kidney, pelvis, ureter and bladder. Tubercles in left kidney and lungs. Perforation of tuberculous ulcer in bladder. Peritonitis.*

John M., æt. 41.

Right kidney weighs 13 oz. On section a large caseous mass occupies the situation of the infundibula and pyramids, while the cortical portion is riddled with softening tubercles, hardly a trace of healthy-looking tissue remaining. The pelvis is somewhat dilated, and contains a few drachms of pus; the walls are thickened and caseous. *Ureter* as thick as the ring-finger, the mucous membrane swollen, and infiltrated with tuberculous matter, which is here and there softening.

Left kidney weighs 6 oz. About a dozen tubercles, the size of peas, occur in substance of the organ. Pelvis and ureter healthy.

Bladder united to the rectum by recent lymph. On opening it the mucous surface is rough, irregular, and contains numerous caseous masses, many of which have ulcerated. At the posterior wall is a large dark ulcer, in the centre of which are two small oval perforations. The outer surface of the organ is covered with fine miliary granulations.

The *prostate* is occupied by two large tuberculous cavities.

The *lungs* contain small cavities and caseous masses at the apices, and numerous miliary tubercles throughout the lobes.

CASE LIV.—*Old scrofulous disease of right kidney, which is converted into cysts. Recent affection of the left.*

J. T., æt. 32. For clinical report by Dr. Ross, see *Can. Med. & Surg. Journal*, Aug. 1877.

Right kidney, small, presents a lobulated appearance, and to the touch is semi-fluctuating. On section the whole organ is seen to be converted into a number of cysts containing a serous fluid in which white flocculi float. There are about a dozen of them, averaging the size of a walnut, and communicating together. The lining membrane of some of them is smooth, of others rough from the presence

Case LVII. *Ch. Pyelitis per stricture. Bladder and right ureter
thickened, inflamed. Left K. large, py injected but no supp. R. K.
much disorganised.*

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PATHOLOGICAL REPORT.

of tuberculous matter. A small remnant of the cortex of the organ is left.

Left kidney, very large, more than three times the size of the right. On section, the pelvis is found dilated, and the walls thick, and covered with a greyish exudation. The calyces are also dilated, and their walls in a similar condition. The pyramids and cortex are swollen and injected, and throughout both are numerous suppurating foci, and small caseous masses, the latter being very abundant, and closely aggregated together at the upper end of the organ. On stripping off the capsule, the surface is found studded with large and small tubercles, the smaller ones coming away with the capsule, the larger adhering to the cortex. These masses are firm, usually solid throughout, but occasionally softened in the centre.

Bladder.—Mucous membrane roughened and ulcerated, fully three-fourths being destroyed, and in places the ulceration has extended to the muscular walls. The *ureters* are not affected. *Lungs* contain a few masses of caseous tubercles.

III

CASE LXXIX.—*Old disease of the right kidney, which is converted into five or six cysts, filled with a putty-like material. Extensive tuberculous disease of the organ. Miliary tubercles in lungs. Albuminoid spleen.*

A. G., a middle-aged woman, short, stout and well-nourished. No history.

Right kidney, weighs rather less than 2 oz., (60 grms), and is converted into five or six cysts filled with material not unlike fluid plaster-of-Paris. A central cyst contains a clear gelatinous fluid, while the contents of those of the lower end of the organ are more consistent and caseous in character. There is no trace of kidney substance to be seen. The pelvis and ureter on this side are much contracted, but still pervious.

Left kidney weighs $12\frac{1}{2}$ oz., (350 grms.); and is much

(case 132). Abnormal. Sept 5 88. Tub. virus. water exposed. and flaked out
 of left ureter. 9 sin. tubercles.
 (133) lungs normal. no tubercles. Both kidneys. Both tubercles moderate
 in size. ureters involved. No other disease of but a few
 Perforation of a scirrhous bladder. peritonitis. death. 62 B.H. Reports of Montreal and
 MONTREAL GENERAL HOSPITAL.

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enlarged. On section the lower third of the organ is occupied by four large cysts containing caseous matter, which lie more in the pyramidal portion, separated from the capsule by a layer of cortex $\frac{1}{2}$ of an inch in thickness.

The remainder of the organ is comparatively healthy, though scattered through it are numerous tubercles, ranging in size from miliary granulations to peas. The vessels are full, especially in the pyramids. The pelvis and calyces are slightly dilated, but not thickened, and only a few tubercles exist on the mucous membrane. The ureter is of full size, and the inner coat presents here and there a caseous patch.

Bladder small and contracted; mucosa rough and extensively ulcerated, the muscular coat being bare over the greater portion of the surface.

Lungs crepitant throughout. A tiny cavity, the size of a pea, in the right apex. A few miliary granulations in both.

Spleen; Malpighian corpuscles enlarged and translucent, reacting with Iodine.

Peri-nephritic Abscess.

CASE XXV.—*Suppuration about right kidney. Pyæmic abscesses in elbows, ankles, and anterior mediastinum. Peritonitis. Pleurisy.*

S. L., æt 11, sent to hospital supposed to be suffering from rheumatism, but the joint affections proved to be pyæmic in character.

On removing the intestines a large, fluctuating swelling is observed in the region of the right kidney, behind the peritoneum, and extending downwards in the direction of the psoas muscle. On cutting into it a pint of laudable pus escaped. The abscess is situated behind and below the kidney, the lower end of which is directly bathed by the pus. The Psoas muscle is infiltrated, and its fibres shreddy and degenerated. The pus has burrowed beneath

the pelvic peritoneum and is in immediate contact with the walls of the bladder and vagina, neither of which are, however, perforated. There is no disease of the bones of the spine or pelvis. On slitting up the common and internal iliac veins, the latter is found obstructed by a thrombus, which is closely adherent to its walls and extends for a short distance as a rough projection into the common iliac.

Right kidney is flattened; on section it is soft and the cortex presents a mottled appearance. *Ureter* and *bladder* normal.

On removing the sternum an abscess is found in the *anterior mediastinum*, close to the bone, and extending for an inch along the cartilages of the 5th and 6th ribs on the left side.

Pericardium, is rough, both layers being covered with small papilliform processes. No flakes of lymph; $\frac{1}{2}$ oz. of turbid fluid.

The left *pleura* close to the vertebral column is intensely inflamed, covered with lymph, and the tissues in the neighbourhood ecchymotic.

Lungs crepitant; one pyæmic block in the anterior border of the left lower lobe.

BLADDER.

The following case is of interest as showing the effect of prolonged irritation of a calculus on the organ.

CASE XCIV.—*Stone in the Bladder. Prostatic tumours around the urethral orifice. Ulceration on mucous membrane Pyelitis; ulceration of apices of renal pyramids.*

A. B., æt. 80, had suffered from stone for years. It was crushed in several sittings and a large proportion brought away, but he sank before the whole could be removed.

Bladder contains an ounce of turbid fluid, and 3ii of crushed stone. The mucous membrane is dark in colour,

here and there eroded but not deeply. The muscular walls are hypertrophied, and strong bands cross each other on the inner surface. Around the urethral orifice are several outgrowths from the prostate; the largest is behind, springing from the base of the gland, and projecting like an enlarged middle lobe. The anterior one is irregular, not so prominent and is divided by small fissures. On the right between these two portions is a pedunculated tumour, a little larger than a pea, freely movable, and which fits directly over the orifice of the urethra, being displaced by the passage of the catheter.

The *prostate* itself is not much enlarged; the ducts are dilated and contain numerous reddish-brown calculi, the largest about the size of a buck-shot.

The *ureters* are moderately dilated, the right more than the left, the mucous membrane is swollen and inflamed.

The *pelvis* of the right *kidney* is dilated, and the lining membrane covered with a dirty greyish exudation. The same condition extends into the calyces and the apices of many of the pyramids are eroded. The same thing, though in a less degree, exists in the other organ.

UTERUS.—*Cancer.*

CASE XLII.—*Epithelioma of cervix; obstruction of the canal; dilatation of the uterine cavity. Pyrometra.*

A. J., æt. 80.

Uterus.—On removal of the abdominal viscera, an oval tumour is seen to occupy the pelvic cavity, extending to the brim, and situated in the position of the uterus, between the bladder and rectum. It is soft, fluctuating, and on examination proved to be the greatly distended body of the uterus. On attempting to make out its exact position, the finger was accidentally thrust into the lower part of the tumour, (the walls in this situation being very thin) and a large quantity of pus escaped. On removal of the pelvic viscera it is found that a cancerous mass involves the

cervix uteri, and upper part of the vagina, occupying the whole circumference of the former and the upper third of the latter, not extending to either rectum or bladder. No trace of the canal of the cervix remains, an irregular portion, somewhat pedunculated, corresponds to the position of the os externum. The disease is confined almost entirely to the cervix, extending only to a slight extent around the lower zone of the body, causing a thickening of the wall in this situation. The cavity of the organ is dilated into a sac, the size of a cocoa-nut, which contains nearly a pint of pus. The walls are thin, scarcely 3" in diameter; the inner surface smooth and of a dark-grey colour. The round ligaments and Fallopian tubes are inserted at the junction of the lower and middle thirds of the dilated body. The latter are not enlarged; one could be traced and opened as far as the wall of the uterus, where it was lost. There is no dilatation of the internal orifices.

The cancer is soft and white in colour in the vagina and lower part of cervix, firmer above where it gradually merges with the uterine wall. In histological characters it corresponds with the so-called epithelioma of this region.

No secondary masses of cancer.

OVARY.

CASE LXXXI.—*Dermoid or Piliferous cyst of right ovary. Chronic Phthisis. Pneumo-thorax.*

J. C., æt. 21.

Right ovary is occupied by a mass the size of an orange, which to the touch is yielding, as if filled with putty-like material. On incising it the capsule is found to be thin and membranous, easily peeled off, exposing a fatty-looking mass, around which are numerous brown and black hairs. At one point a dense whisk passes round the entire circumference of the tumour. The hairs are readily

detached and average eight or ten inches in length, being pointed at both ends. They are nearly all superficial, forming a thin layer, immediately within the capsule, and on top of the fatty sebaceous matter, which constitutes a layer $\frac{1}{2}$ " in thickness, white in colour, and containing a few hairs. This rests upon the central body of the tumour, which forms a firm mass, about the size of a walnut, closely attached to the broad ligament, at the usual site of the ovary. The surface is rough, irregular and pitted, and from it numerous hairs arise and pass out through the sebaceous matter. The layer has the structure of skin, and contains numerous hair follicles and sebaceous glands. On section of the central mass a small cavity, the size of a marble, is found, full of clear, viscid fluid. Beneath this, corresponding to the attached border of the tumour, the parts are very dense and hard, and on careful dissection an irregular piece of bone was found, shaped somewhat like the flange of a screw, having a handle-like process, and an expanded, concave body, which is beset on both surfaces with sharp dentate projections. In colour and hardness it resembles enamel.

CEREBRO-SPINAL SYSTEM.

Tuberculosis.

CASE XVIII.—*Small cavity and caseous masses in lung. General tuberculosis. Meninges of brain unaffected; central softening. Spinal meninges extensively involved.*

O. B., æt. 20, sailor. Symptoms chiefly spinal, and attributed to a fall which he had sustained three weeks before his death.

Autopsy 36 hours after death.

Brain, extremely soft, and with difficulty removed. Sub-arachnoid fluid in excess. Large veins of pia mater moderately full. Convolutions pale and flattened. Arach-

noid and pia mater are clear and natural looking, both at base and cortex. The former where it stretches from the cerebellum to the cord is cloudy, but there is no lymph or inflammatory effusion. Middle cerebral arteries and pia mater of Sylvian fissures carefully examined for tubercles, but none were found, even on microscopical examination. On section of the hemispheres the brain substance is soft, moist, and glistening; puncta vasculosa indistinct. Lateral ventricles much dilated, and contain flaccid fluid. The dilatation affects especially the posterior horns, which extend far back towards the cerebellum. The walls are excessively soft, and, for the most part, converted into a reddish-white creamy substance, consisting of degenerating brain matter, blood corpuscles, and Gluge's cells. A gentle stream of water washes the layer off, leaving the parts beneath rough and irregular, and to the touch very friable. Septum lucidum soft, and on removal separated from the fornix. Velum interpositum and choroid plexuses pale, no lymph or tubercles. Walls of third ventricle soft, but intact, commissures uninjured. Corpora striata and thalami optici soft and moist; grey substance reddened.

The most careful examination failed to detect any tubercles either in the meninges or brain substance.

Spinal cord. On removal, the arachnoid stretching from the cerebellum is noticed to be opaque and granular. Laid upon the table the cord presents at the lower part slight irregularities and bulgings. The dura mater is thick and opaque; the arachnoid lining its inner surface is scattered over with numerous miliary tubercles, like grains of sand, very abundant in the dorsal and lumbar regions, less so in the cervical. As far as the lower part of the cervical enlargement the visceral arachnoid is clear and transparent, and the pia mater can be distinctly seen through it. From this point to the termination of the cord the arachnoid is opaque, and the sub-arachnoidal space filled with turbid lymph, the membrane over the centre

of the lumbar enlargement being much distended. On exposing the pia mater a thin layer of yellowish-white lymph covers it in the dorsal and lumbar regions, becoming more abundant at the cauda equina, the filaments of which are surrounded by thick lymph as far as the termination of the sacral canal. On the lumbar enlargement is an isolated white mass, looking like an enlarged tubercle, attached to the pia mater, but on section the contents are soft, and like the lymph over the general surface. The vessels of the pia mater on the posterior part of the cord are full, on the anterior empty. Scattered over the membrane, chiefly along the course of, and about the vessels, are numerous miliary granulations, most abundant below the cervical enlargement, only a few being noticed above this point. The cord appears very tightly embraced by the pia mater, so much so that the surface looks wrinkled, and on puncturing it at the cervical enlargement, the white substance bulges out as a soft rounded mass.

Section of the cord shows it to be very soft, but not otherwise altered.

Lungs.—Small caseous masses in both apices, and in the left an old cavity, the size of a walnut, with firm dark walls. Rest of organs crepitant, but stuffed with small miliary tubercles, isolated, angular, and translucent.

Spleen.—Innumerable firm miliary granulations throughout the tissue.

Kidneys.—A few tubercles in the cortex of the right organ.

Liver contains scattered tubercles.

CASE XLIII.—*Meningeal affection slight. Ventricles distended, walls soft. Very few miliary tubercles in the organs.*

E. H., a delicately built girl, æt. 19; symptoms chiefly cerebral.

Brain. Parts about the optic nerves matted together,

and the arachnoid opaque. No lymph at the base or in the Sylvian fissures. Careful inspection fails to discover any tubercles on the pia mater; but on stripping off the membrane on the Sylvian fissures, and washing it in water, numerous miliary granulations can be seen, chiefly as fusiform thickenings of the small arterioles passing into the convolutions. Veins on the cortex moderately full, convolutions a little flattened. On section of the hemisphere, the white substance is of average consistence, but moist. The lateral ventricles are large, and contain a slightly turbid fluid. The ependyma is granular; over the ganglia, soft. Fornix and septum very soft, and could not be lifted up.

Spinal cord. Veins full. Arachnoid in cervical portion opaque. On the visceral layer of arachnoid in the lower three-fourths of the cord there are numerous small cartilaginous plates, thin, flexible, irregular in outline, and presenting the usual glistening appearance of these bodies. No tubercles on pia mater.

Lungs. Lower lobe of right, heavy, airless, and contains much blood and serum. A few tubercles through the substance of both organs. Bronchial glands enlarged; one presents several caseous masses, the others, small, firm miliary granulations. No tubercles in the other organs.

CASE LXXV.—*Meningeal affection very extensive on the cortex, slight at the base. Ventricles large, walls not soft. Large caseous mass in left lung. Miliary tubercles in lungs and on peritonæum.*

J. S., æt. 2½, male child, much emaciated. Cervical glands much enlarged; one over ramus of right jaw fluctuates.

Brain. On surface the veins of pia mater look full, and there is a good deal of fluid beneath the arachnoid. A thick layer of yellowish-white lymph exists along the longitudinal fissure, especially on the right side, and on

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separating the hemispheres the same is seen in the region of the occipito-parietal fissures. On the inner surface of the left hemisphere, near the fissure of Rolando, is a thick, tuberculous patch, which extends into the brain substance for a quarter of an inch, and the pia mater about it is studded with small tubercles. Over the left frontal convolutions above there are eight or ten tubercles, the size of No. 8 shot. On the right parietal lobe, just above the Sylvian fissure, there is a thick layer of lymph. The base is comparatively free, the arachnoid clear, and no lymph is seen. In the right Sylvian fissure the parts are matted together, and tubercles may be seen about the smaller arteries. On section of the hemispheres, the brain substance is found to be glistening and moist, not hyperæmic. The ventricles are moderately enlarged, and contain a clear serum; ependyma clear; walls not softened, and the fornix and septum are tolerably consistent, being lifted without tearing.

Lungs. The left has a peculiar soft puffy feel. At the lower part of the upper lobe is an oval caseous mass, the size of a large cherry, firmly encapsuled and d.y. The rest of this organ and the right lung are stuffed with miliary tubercles, all of which are small, isolated, and translucent; no cheesy masses in the latter. Bronchial glands enlarged; two caseous. A few tubercles on both layers of the pleura.

Peritonæum. On the visceral layer, especially over the shrunk small intestines, are numerous small dark tubercles, from size of No. 8 shot to peas. On the parietal layer they also abound, and on the left side form a flattened irregular mass, with very dark edges. The glands at the root of the mesentery are enormously enlarged and caseous, forming a bunch as large as the closed fist of the child.

No tubercles in the other organs.

CASE LXXVI. — *Slight meningeal inflammation. One caseous mass and a few tubercles in Lungs. Old morbus coxæ.*

A. B., æt. 5½, an ill-nourished, emaciated child.

Brain. Pia mater injected, and of a deeper red colour than usual. No tubercles or lymph about cortex or sides, but the arachnoid over the sulci is cloudy and granular. At the base the arachnoid is quite clear, but the pia mater is somewhat more adherent than usual and matted about the chiasma. No lymph. On the Sylvian fissures small tubercles occur on the arterioles, and in the right there are a few flakes of lymph. On the small arteries over the pons and medulla are numerous translucent granulations. At the upper border of the cerebellum, near its attachment to the cerebrum, there is a layer of thick lymph. On section of the hemispheres the brain substance is moist; puncta vasculosa distinct. The ventricles are slightly dilated, and contain a clear fluid. Walls not so firm as natural. Fornix and septum tear easily. Velum interpositum and choroid plexuses cloudy, and a few tubercles are seen about the arteries.

Lungs. At extreme apex of right is a small caseous spot, the size of a pea, and in the tissue for an inch about it are two or three dozen miliary tubercles. In the left lung, which is crepitant throughout, there are also a few miliary granulations at the apex. *Bronchial* glands are large, one or two of them caseous.

Head of *right femur* is rough and ulcerated, no cartilage remaining.

GENERAL DISEASES.

Pernicious Anæmia.

CASE LXI. — *Profound Anæmia without discoverable lesion. Fatty degeneration of organs. Hyperplasia of bone-marrow.*

G. A., æt. 52, an Englishman. — For clinical report by

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Dr. Gardner, see *C. M. & S. Journal*, March, 1877. A description of the blood and bone-marrow, by Dr. Gardner and myself, occurs in the *Centralblatt f. die medicinischen Wissenschaften*, No. 15, 1877: Berlin.

Autopsy.—Thirty-two hours after death.

Body that of a well-built man of fair muscular development. Hair grey. No emaciation; panniculus adiposus well developed, especially over abdomen. Skin of extraordinary pallor, with slight lemon tint, the shoulders marked with patches of deeper yellow hue. A few old psoriasis spots seen in the region of the elbows and knees. No petechiae. Lineæ albicantiae in the skin of groins, and upper and outer aspect of thighs, and on the outer edge of anterior folds of axillae. Fingers slightly clubbed, and the nails of both hands markedly incurvated. Rigor mortis moderately well marked. Post mortem stains scarcely perceptible. No enlargement of the superficial lymphatic glands. No cadaveric odour.

Brain.—Not examined.

On making the preliminary incision a layer of deep yellow fat, fully an inch in thickness, is cut through over the abdomen. Muscles of the thorax of a remarkably healthy red colour. In the abdominal cavity the position of the viscera normal. Omentum moderately fatty. In the thorax a considerable amount of fat over the pericardium. The left pleural sac contains twelve ounces of bloody, yellowish-tinged, serum. A few strong adhesions posteriorly. In the right pleural sac ten to twelve ounces of fluid of the same character. Adhesions more numerous at apex and sides.

Pericardium.—Contains six drachms of a yellowish, bloody serum. No ecchymoses on either leaf.

Heart.—Large, excessively flabby. Sub-pericardial fat abundant about the base and in the anterior ventricular groove. Patch of attrition over upper part of right ventricle in front, and another behind, near the inferior vena cava. On opening the heart in situ an ounce of

blood, with one small coagulum, in the cavities of the right side, and ten drachms in those of the left. Organ flaccid, and walls collapsed when on the table. Right auricle normal. Right ventricle somewhat dilated, the endocardium stained by imbibition. Tricuspid valves a little thickened and gelatinous at the edges; orifice of normal size. Pulmonary semi-lunar valves healthy, one segment fenestrated. Cavity of left ventricle large, walls of normal thickness. Mitral valves quite healthy, a little stained, orifice of proper size. Aortic semi-lunar valves a little opaque; slight atheroma at their base, and on the aorta opposite their free borders. Sinuses of Valsalva very distinct. Nothing abnormal in the left auricle. Muscle substance of the organ exceedingly pale, having a yellowish, faded-leaf appearance, especially marked in the walls of the left ventricle.

Aorta.—Both arch and trunk of full size. Beyond the left sub-clavian there is a flattened patch of atheroma, about the size of a half-penny.

Lungs.—Deeply pigmented; crepitant throughout; lower lobes œdematous and dark in colour posteriorly. The mucous membrane of the *Trachea* at the bifurcation, and extending irregularly nearly to the larynx, is represented by a number of bony plates, lying immediately upon the cartilages, which are themselves very dense and partially ossified.

Spleen.—Weight, six ounces; soft and flabby, Capsule a little opaque. On section, pulp soft, of a light brownish-red colour. Trabeculæ distinct. Malpighian corpuscles not evident. Very little blood in the organ; none could be obtained from the splenic vein.

Left Kidney.—Length, 5". Unusual amount of superficial fat. Capsule loosely attached and on removal leaves a very anæmic-looking organ. No atrophy of the cortex, which is pale and bloodless. Pyramids, except at the bases, also pale. *Right Kidney*, 4½" long, dark red in colour, uniformly congested, forming a striking contrast

to the other. Capsule easily detached; stellate veins prominent. On section, both cortex and medulla contain much blood.

Supra-Renal Capsules.—The right is soft in centre, and somewhat larger than the left, but nothing unusual about either.

Bladder.—Distended with pale urine. Mucous membrane healthy looking. Prostate gland of full size.

Tonsils and glands at root of tongue not enlarged. Several ecchymoses beneath the mucous membrane of the anterior wall of the pharynx.

Œsophagus presents nothing unusual; a few small extravasations are noticed near the cardia.

Mucous membrane of *stomach* pale, and at the cardiac end thin; at the pylorus it is thicker.

Duodenum healthy; common bile duct is pervious.

Jejunum contains a quantity of dirty yellow mucus. Mucous membrane is pale. In the *ileum*, Peyer's patches are scarcely perceptible; the solitary glands towards the ileo-cæcal valve are alone distinct. In the *large bowel* the mucous membrane is anæmic. No ulceration. Scurvy in transverse and descending colon.

Liver.—Rather small, of a light yellow colour, especially in the left lobe. Capsule smooth. On section a small quantity of liquid blood is seen in some of the hepatic veins. In places there is a very slight injection of the intra-lobular veins, which relieves the otherwise uniformly pale surface.

Gall-bladder.—Full of dark tarry bile.

Pancreas.—Looks healthy.

Abdominal blood-vessels almost empty. No blood in inferior vena cava or aorta. Intima of both healthy-looking. *Thoracic Duct* pervious throughout. Mesenteric and retro-peritoneal *lymphatic glands* small, the former unusually so, requiring considerable searching to obtain any. The amount of blood in the body appeared remark-

ably diminished, and it was only by pressing along the limbs that sufficient could be obtained to fill a small homœopathic phial.

Piece of the sternum, the upper half of right fibula, the inner third of left clavicle, half a rib, and one of the last dorsal vertebrae were removed for the examination of the marrow. Blood was collected from the heart, and junction of the left jugular vein with the sub-clavian.

A striking feature in the autopsy is the extreme anæmia of the organs, their almost entire bloodlessness and consequent pallor, the right kidney excepted.

HISTOLOGICAL EXAMINATION.

The blood examined during life, and after death, presented the following appearances. (Hartnack, No. 9 im. and Oc. 3.)

About one-half of the red-blood corpuscles run together to form rouleaux. The majority of them appear of large size but do not present the characteristic round contours of these bodies; many are ovoid, others lozenge-shaped, or of various forms, with irregular projections and processes. Isolated corpuscles look of the natural pale yellow colour, but the alternating light and dark centre with the change of focus is not so distinct as usual. On touching the top cover and causing them to roll over, many do not present the bi-concave appearance, but look thin and flattened out. A limited number are crenated. In each field certain small round red corpuscles are seen, sometimes as many as six or eight. They are spheres, not biconcave, of a pale yellow colour, occasionally crenated or irregular in form.

The measurements of some of the coloured elements are given below (Hartnack No. 16 im.), from which an accurate idea is obtained of the remarkable discrepancies in size. About forty measurements were made of corpus-

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cles taken at random in two or three specimens obtained a few days before death. Of these one was 1-1833" by 1-2619", being somewhat elongated. Five ranged from 1-2750" to 1-2115", these being the extremes. In twenty-two the range was from 1-3000" to 1-4200". In this group the ordinary-looking red disks occurred. In five the diameter varied from between 1-5000" and 1-9000." In five the diameter was less than the 1-6000", the lowest being 1-6874."

Prolonged examination failed to discover a single nucleated red corpuscle.

The colourless corpuscles did not appear relatively increased. One or two were seen in each field of the No. 9 and 3. The measurements in five corpuscles ranged from 1-2500" to 1-1800". They were quite natural looking, and displayed a remarkable degree of vitality. In a slide mounted and surrounded with paraffine at 1 P.M., the amœboid movements were very active, the temperature of the room being about 60°.* At 7 P.M. the slide was carried in the hand a distance of a quarter of a mile to the house of a friend (temperature 14.2° F.), and the irregular changes in outline were still observed, and continued until 8:40, when the observation was discontinued. There was an entire absence of Schultze's granular masses.

Prolonged examination of different specimens after death, made for this special object, resulted in the detection of two nucleated red blood corpuscles.

Heart.—The fibres are in a condition of extreme fatty degeneration, the striae being obscured by the number of densely crowded droplets and fine molecular fat; only

* It may be here mentioned that the statement of Ranvier, *Traité d'Histologie* (p. 240), that the amœboid movements of white blood corpuscles do not go on at ordinary temperatures is incorrect. In University College Laboratory, London, I found on one occasion that the amœboid movement continued in the colourless corpuscles twenty-four hours after removal from the body. The blood was sealed in a capillary tube, and remained at the ordinary temperature in the month of June.

here and there a fibre occurs in which the striæ are faintly seen, In teased preparations numerous short bits occur, together with oil-drops and granules of fatty matter. In places there appears to be a good deal of interfibrillar connective tissue with fat cells.

Muscles of the Trunk.—The fibres of the thoracic muscles—which were observed to be of such a natural appearance—present no trace of fatty degeneration.

Spleen.—The ordinary corpuscles of the pulp, together with elongated, sometimes branched, cells of the retiform tissue are the chief elements seen in teased specimens. The red corpuscles have lost their colouring matter. A few cells containing red blood corpuscles are seen, but no nucleated red cells.

Kidney.—Teased preparations show the epithelium of the tubules, both in the cortex and pyramids, covered with fatty matter in the form of minute drops and fine granules; nowhere, not even in the large collecting tubes are the cells distinct. The Malpighian corpuscles also contain many granules and small oil-drops, and the same exist abundantly in the field.

Liver.—Cells are stuffed with oil-drops; none noticed without them, while in many the protoplasm and nucleus are entirely obscured. Free fat exists infiltrated between the cells, and in the field. In a few bile pigment is seen.

Mesenteric Glands.—Teased portions present a large number of perfectly normal-looking lymph corpuscles, among which the connective tissue elements occur in the usual proportion. Many of the small vessels and capillaries have their walls uniformly studded with fat grains, and may be traced as dark branching lines. In others, the deposition is not so extensive.

Nothing abnormal observed in the axillary lymphatic glands.

Medulla of Bones.—The marrow of all the bones examined—sternum, ribs, clavicle, vertebra, fibula—is of

a dark violet-red colour, thick, about the consistence and colour of the spleen pulp in fever. In the clavicle it is more diffuent, of a lighter red colour, and to the naked eye looks a little fatty—an appearance not noticeable in the other bones, not even in the shaft of the fibula.

On microscopical examination, the following elements were found :—

(1) Colourless corpuscles—marrow cells—of various size, with granular protoplasm, and bold vesicular nuclei. The greater number of these are larger than white blood corpuscles, and have usually a single nucleus, sometimes two. Others are smaller, more approaching the blood corpuscles in form, while in all the specimens examined, small round cells, like ordinary lymph corpuscles, are also found. The above represent the common colourless elements found in marrow, and they form the majority of the corpuscles in the field. In eight of the larger cells the extremes of measurement were 1-1571" by 1-1833" and 1-2200" by 1-2895".

(2) Coloured blood corpuscles, of which two varieties are seen ; (a) ordinary biconcave disks, somewhat irregular in shape, and often, as noticed in the blood during life, provided with long processes. They are abundant, forming the large proportion of coloured elements. In the fibula, sternum, and ribs the colouring matter is retained, while in the vertebra and clavicle it has disappeared from most of the corpuscles, and they are recognizable only as outlines. (b) Small round red corpuscles, non-nucleated, from one-quarter to one-half the size of ordinary corpuscles, and similar in appearance to the small forms seen in the blood. They occur most numerous in the marrow of the fibula, where they form fully one-fourth of the coloured corpuscles. In the sternum and ribs they are not so abundant, though occurring in each field. As described in the blood itself, they do not appear to be biconcave disks, but spheres. The colouration is quite

as intense as in form *a*, and a few were observed to be crenated.

(3) Nucleated red corpuscles, the "transitional" forms of Neumann, which are numerous in the sternum and ribs, less so in the fibula while in the clavicle and vertebra they occur scantily, or, owing to the general decolorization of the red corpuscles in these bones, are seen with difficulty. As shown by the measurements given below they are as a rule larger than ordinary blood corpuscles, but present, like them, a perfectly homogeneous coloured stroma, in which a finely granular nucleus is imbedded. They are spheres, not biconcave, as a rule round, though frequently irregular in outline, or with one end pointed and prolonged. The intensity of the colouration in most equalled that of the ordinary red corpuscles, in some instances being deeper, in others not so marked. The nuclei are either round or elliptical, and occupy from one-quarter to one-half of the body of the cell (see measurements). They are solid, granular, and inside the corpuscles look coloured, though not so deeply as the surrounding substance. The presence of nucleolus could not be determined. The position in the cells is variable; in specimens examined within a short time after the post-mortem they appeared to be chiefly centric, but in preparations taken the next day very many of them had become quite peripheral, while others had protruded almost through the corpuscle, when it could be clearly seen that the nucleus was colourless. In several instances the nuclei are seen to be entirely outside the cells, though remaining attached to them. In this condition they look not unlike the small lymphoid marrow cells, and it is only the large size of the corpuscles to which they adhere, and the fact that in the same field others may be seen half-way out, that enables a correct opinion to be formed. In three or four instances dumb-bell-shaped nuclei were noticed. Cells with two nuclei were not uncommon,

and instances with three and four were observed. As remarked above, the nucleated red forms are numerous in the sternum and ribs, six to eight being seen at once in the field of the No. 9 in. and 3, while in the fibula not more than three or four were noticed in any single field. In fifteen measurements of these forms, eleven were above the 1-2000"; five being 1-1428". The following measurements are of three corpuscles with their contained nuclei:— (1) 1-1774" by 1-2200"; nucleus 1-2619" by 1-2896". (2) 1-2200" by 1-2391"; nucleus 1-5500" by 1-5000". (3) 1-2037" by 1-1964"; nucleus 1-3666" by 1-3235. A good idea of the irregularity in outline of these corpuscles and the slightly elliptical character of the nuclei may be gathered from the above.

(4) Cells containing red blood corpuscles. These are very abundant in the marrow of the vertebra, three or four occurring in the field at once, and containing from five to six red corpuscles, the colour and outlines of which in most cases are preserved. In the sternum and ribs they are not nearly so numerous; in the fibula and clavicle they were not observed.

(5) Myeloplaques, of which one or two only were met with in the marrow of the sternum and rib. Neither in the shaft nor epiphysis of the fibula could these forms be determined.

(6) Fat cells, which are present in marrow of the clavicle in small numbers, absent in the sternum, vertebra, and rib. In marrow from the fibula an oil drop is occasionally met with in the field, but here also they are almost entirely absent.

(7) The octahedra crystals, first described by Charcot, and which always occur in the marrow from twelve to thirty-six hours after death.

CASE XC VII.—*Profound anæmia, without discoverable lesion. Fatty degeneration of organs. Hyperplasia of bone-marrow.*

J. B., æt. 47, an Englishman. For clinical report, by Dr. Bell, see "Transactions of Canada Medical Association," vol. 1, 1877. A description of the blood and bone-marrow in this case also occurs in the *Centralblatt f. d. med. Wissenschaften*, No. 25, 1877.

Body that of a spare man, 5 feet 5 inches in height; complexion fair, hair light, whiskers red. The skin presents a yellowish tinge over the whole body, most marked on the face, neck, and shoulders. Rigor mortis well developed. Slight œdema of lower extremities. Four or five smooth white cicatrices on the right side of the leg. Freckles abundant on forearms. Panniculus adiposus thin.

Brain.—Skull unusually thick; marrow of diploë red. About 2 oz. of serum escaped on removal of the dura mater. Vessels of the pia mater empty. Pacchionian granulations numerous. Brain substance pale, of good consistence. Nothing abnormal in the ventricles or ganglia at the base. The remarkable pallor of the tissues is the most noticeable feature. Weight, 3 lbs. 3 oz.

Thorax and Abdomen.—The voluntary muscles exposed in the preliminary incision are of rich dark-red colour. Intestines and omentum pale and bloodless; position of abdominal viscera normal. In the thorax the right pleura contains a pint of reddish serum, the left half a pint, in which a few flocculi of lymph are seen. There are pigimentary (?) deposits upon parietal layer over diaphragm and bodies of the vertebræ.

Pericardium is normal, a few ecchymoses on visceral layer over left ventricle.

Heart, very flaccid, walls of chambers collapsed. A good deal of sub-pericardial fat, especially over the right

cavities. Ventr. cavie nearly empty. Right auricle contains 5 iss. of blood, light claret-coloured, and one small coagulum, partly decolorized. Right ventricle contains a small amount of blood; walls thin; endocardium stained. Valves healthy. Musculi papillares pale yellow colour. Left auricle empty. Left ventricles contain very little blood; lining membrane stained. Walls of normal thickness, muscle soft, somewhat paler than normal. Valves healthy. Aorta of normal diameter.

Lungs; pigmentation moderate; slight congestion (post-mortem) in dependent parts, and also an excess of serosity. Structure healthy.

Spleen, slightly enlarged, weighs 3 x. Numerous adhesions, infiltrated with serum, bind it to the diaphragm, stomach, and colon. On section, pulp very soft, almost diffuent, dark red in colour.

Left kidney, 5½ inches long. Section shows a pale, coarse organ, somewhat than natural. *Left supra-renal capsule* pale, soft in the centre.

Right kidney, moderately congested in the cortical portion and at bases of pyramids. Cones very pale. *Right capsule* healthy. Bladder healthy. Vesiculae seminales contain spermatozoa. *Stomach* distended with gas; contains about 4 oz. of a brownish viscid fluid. Numerous ecchymoses along the greater curvature, especially at the cardiac end. The veins contain blood. Mucous membrane looks normal.

Duodenum and *jejunum* healthy. Coats of the *ileum* very thin, translucent, and anæmic. The solitary glands are prominent in the upper part; only one patch of Peyer found in the lower portion. Large bowel normal.

Mesenteric glands appear even smaller than natural.

Pancreas healthy.

Liver, a few ecchymoses on capsule, a small cicatrix on upper surface of right lobe. Substance pale, in parts much softened. Weight 3 lbs. 8 oz. Gall bladder contains normal-looking bile.

HISTOLOGICAL EXAMINATION.

The *blood* examined during life was very thin, watery, and of pale claret colour. It presented the following characteristics:—Colourless corpuscles appear perfectly natural in structure and size, and are not numerically increased. No large granular ones, such as described by Litten* could be found. Two forms of coloured corpuscles: (a) ordinary forms, which are paler than natural, flattened out, less biconcave, and very irregular in outline, some ovoid, others with sinuous borders, others again with pointed processes. (b) Small red corpuscles—microcytes,—erroneously described by Eichorst as pathognomonic of this affection. They were numerous, 8 to 10 occurring in the field of No. 9 im. and oc. 3. The diameter ranged from 1-5000" to 1-9000." They equalled, or even exceeded, in colouration the ordinary forms; some were crenated, and they frequently presented a pit or cup-like depression on one side. In the repeated examinations of the blood, extending over three months, these forms increased but little numerically.

Schultze's granular masses were not noticed. No appreciable difference could be detected in the histological appearance of the blood an hour after the transfusion.

The *heart* presented signs of moderately advanced fatty degeneration, the striæ in many fibres being obscured by molecular fat and droplets of oil.

Spleen.—The normal elements, cells of the spleen pulp, and spindle-shaped corpuscles of the trabecula, together with numerous blood corpuscles, were the only structures noticeable in teased preparations.

Kidneys.—In both cortical and pyramidal portions the cells of the tubules appear very granular, somewhat swollen, and a large number of oil droplets are seen in and about the tubules.

* Berliner Klinische Wochenschrift, No. 19, 1878.

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Liver.—Cells contain oil drops in excess, and in many the nuclei are obscured. There is also some fatty infiltration.

The *marrow* of all the bones examined, sternum, ribs, vertebrae, radius, fibula, was of a violet-red colour, of good consistence, and with the exception of that of the fibula, contained no fat. There were found the ordinary large, coarsely granular, marrow cells, numerous small lymphoid corpuscles of both sizes: and, in addition, very many nucleated red blood corpuscles, corresponding with those described by various writers as occurring in the marrow in cases of leukæmia, and by Cohnheim* and myself† as constituents of this tissue in certain cases of pernicious anæmia. There were not many in the marrow of the sternum, fewer still in that of the vertebrae. They were considerably larger than the ordinary red blood corpuscles and of about the same intensity of colouration. The majority had only one nucleus, but cells with two, three, and four were not uncommon. The position of the nucleus was usually eccentric, often, indeed, protruding half way from the corpuscle. The nuclei were colourless.

* Virchow Archiv., lxxviii. 1876.

† Centralblatt f. d. Med. Wissen. No. 15, 1877.

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ON THE

PATHOLOGY OF THE SO-CALLED

PIG-TYPHOID.

BY

WILLIAM OSLER, M.D.,

*Professor of Physiology and Pathology in McGill University, and the Veterinary
College, Montreal.*

Reprint from the VETERINARY JOURNAL, June, 1878.

London:

BAILLIÈRE, TINDALL AND COX,
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ON THE
PATHOLOGY OF THE SO-CALLED
PIG-TYPHOID.*

THE most diverse opinions prevail as to the true nature of this disease; upon these I shall not comment at length. Many of the Continental pathologists class it with Anthrax, and in some of our English text-books it is treated under the same heading. The researches of Budd, in 1865, led him to the conclusion that it was a Typhoid Fever; those of Murchison, that it belonged rather to the dysenteric affections. The interest excited in the disease by these early investigators died away, to be awakened ten years after by a series of papers from the pen of Professor Axe, in which he substantiated and extended the views of Dr. Budd, stating that, etiologically, clinically, and pathologically, the disease was an exact counterpart of human Typhoid. Dr. Klein has more recently investigated the disease with special reference to this point, and has arrived at an opposite conclusion—holding that the so-called Pig-Typhoid has no analogy with the disease bearing this name in man.

Having, in the course of my reading, become acquainted with this unsettled state of the matter, I gladly, at Principal McEachran's suggestion, investigated a local epizooty which had broken out near Quebec, in a drove of 300 hogs; hoping

* An abstract of this paper was read before the Pathological Society of New York, January 23rd, 1878.

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that, by a series of independent observations, the truth of one or the other of these views might be confirmed.

ETIOLOGY.

The highly contagious and infectious nature of this malady has been known for years—being first established, I believe, by Dr. Sutton, of Illinois. The following experiments, though limited in number, are, I think, worthy of record, as they confirm and extend those of Professor Axe and Dr. Klein.

Experiment I.

September 1st.—A sow pig, ten weeks old, was inoculated with lymph and blood obtained by squeezing a portion of ecchymosed skin from a diseased animal, and collecting the exudation on ivory points.

No change noticed until the 6th, when the animal did not appear so lively. Temp. $104\frac{2}{3}^{\circ}$.

7th.—Place of inoculation has dried up. A diffuse subcutaneous redness exists over skin of belly, and certain of the hair follicles are swollen, papular, and surrounded by irregular but circumscribed zones of hyperæmia. These are best seen in the groins, where the general redness is not so marked. Temp. 105° .

9th.—Blush on abdomen not so vivid. Spots about hair follicles persist. Animal feeds well. Temp. $106\frac{1}{3}^{\circ}$.

11th.—A few reddened papules on skin of abdomen. Hyperæmia has faded. Temp. $106\frac{2}{3}^{\circ}$.

13th.—No change. Temp. 106° .

14th.—Skin looks harsh, and the hairs appear rougher than natural. Temp. $106\frac{2}{3}^{\circ}$.

16th.—Eyes watery. Animal looks ill, but feeds well, and has no diarrhœa. Temp. $106\frac{1}{3}^{\circ}$.

17th.—Back somewhat drawn up. Dirty secretion about the eyelids. Skin of abdomen is of a dusky-red hue, and the papules about the hair follicles are again very distinct. A few ecchymoses about the back of ears. Temp. $105\frac{4}{5}^{\circ}$.

18th.—Skin of whole body of a deep dusky-red colour,

brightest on the abdomen. It disappears on pressure, returning very slowly. Over the sternum and in the axillæ there are definite ecchymoses. Inguinal glands are swollen. Animal does not feed so well. No diarrhœa. Mucous membrane of rectum reddened. Temp., morning and evening, 102° .

19th.—Much the same. Temp. morning 104° , evening 105° .

20th.—Skin harsh. Eyes lustreless. Not so red. Ecchymoses have not extended. Temp., morning and evening, 105° .

21st.—Animal feeds better; redness much diminished. Temp., morning 104° , evening 103° .

22nd.—Inguinal glands still swollen. Temp. $104\frac{1}{2}^{\circ}$.

23rd.—Ecchymoses fading on belly, but still distinct behind the ears. No diarrhœa. Temp. 104° .

25th.—Animal has lost flesh, but is not much emaciated. Temp. 103° .

26th.—Temp. 106° . The extravasations are scarcely visible.

27th.—Temp. $104\frac{1}{2}^{\circ}$. Swellings of the inguinal glands not so marked.

28th.—Temp. 104° . Animal decidedly better. Feeds well.

29th.—Temp. $103\frac{3}{5}^{\circ}$.

30th.—Temp. $103\frac{3}{5}^{\circ}$. Is brighter; skin not so harsh, but on belly numerous dirty scales can be scraped off.

From this time the animal improved in every way, and appeared convalescent. On October 10th I inoculated it again with blood from Case V. (fed with diseased intestine). During the succeeding week I was so occupied that the animals were not visited. I then found this one febrile, temp. 106° , ecchymoses in ears, and suffering from diarrhœa. It became moderately emaciated; the fever kept up, though it was never high; and extravasations occurred about the thighs. It died on October 25th.

Post-mortem.—A few patches in cæcum and about valve, and half a dozen in the colon; some of the latter are excavated with puckered infiltrated edges. Lungs unaffected.

Experiment II.

September 1st.—A ten-weeks-old sow pig was inoculated by scratching and rubbing in material obtained from an intestinal

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plaque of a diseased animal. Pulse immediately after the operation 100. Temp. 106° , with two thermometers.

Nothing unusual noticed at the daily visits, until the evening of the 6th, when the animal appeared less lively, and lay beneath the straw. A swelling has been gradually forming at the site of inoculation, and an inguinal gland in the neighbourhood is enlarged.

7th.—A faint, just perceptible redness exists on skin of belly and inner surfaces of front legs; in the latter situation are a few hyperæmic papules about the hair follicles. Temp. 105° .

9th.—Redness gone. No constitutional disturbance. Temp. $105\frac{2}{3}^{\circ}$.

11th.—No change. Temp. 105° .

13th.—Hyperæmia gone. One or two papules in groins and inner surfaces of legs. Temp. 106° .

14th.—Swelling at site of inoculation persists. Inguinal lymphatic glands enlarged on right side. Temp. 107° .

16th.—No change. Temp. 106° .

17th.—Does not look so ill as the other animal inoculated at the same time. No cutaneous affection; no diarrhœa; feeds well. Temp. $105\frac{1}{3}^{\circ}$.

18th.—Temp. $102\frac{2}{3}^{\circ}$; evening 103° .

19th.—Morning temp. $101\frac{2}{3}^{\circ}$; evening 104° . Condition the same. Has become thin, but not so much so as the other animal.

20th.—Temp., morning 103° , evening 104° .

21st.—Temp., morning 104° , evening $103\frac{1}{3}^{\circ}$.

22nd.—Morning temp. 102° . Does not look ill.

23rd.—Temp. $103\frac{2}{3}^{\circ}$.

24th.—Temp. 103° .

25th.—Temp. 104° .

26th.—Temp. 105. Anus slightly prolapsed, but mucous membrane not injected. No diarrhœa.

27th.—Temp. 104° .

28th.—Temp. 104° .

29th.—Temp. $103\frac{2}{3}^{\circ}$.

30th.—Temp. $103\frac{1}{3}^{\circ}$.

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the symptoms were so slight that I had doubts whether it had been affected at all.

On October 10th, I inoculated it subcutaneously with blood taken from the inferior cava of animal the subject of Experiment V., and killed on that day. During the following week, I was so much occupied that I neglected to visit the pig-pen, and was considerably astonished on the 18th, when the keeper sent word that the animal was dead. He stated that it had become much worse since the inoculation. I found the animal with the cutaneous lesions well marked, and the intestinal disease well developed.

Post-mortem.—Extravasations on thighs, buttocks, and ears. Recent peritonitis, pericarditis, and pleurisy.

Lower half of left lung pneumonic. Bronchial glands much swollen. *Stomach*: at fundus there are from ten to fifteen small yellowish patches, the largest the size of a sixpence; all confined to the mucosa.

Entire mucous membrane of cæcum infiltrated. In colon numerous button-like masses, many of which extend through the entire thickness of the bowel. No signs of softening or ulceration in any of the patches. Mesenteric glands swollen, but not hamorrhagic.

Experiment III.

September 10th.—Caseous matter from bronchial tubes of a fatal case, in which there was no intestinal lesion, rubbed up with saline solution ($\frac{3}{4}$ per cent.); of this m. xv. injected subcutaneously in the left flank.

13th.—Temp., morning 103° , evening 103° .

14th.—No change noticed. Temp., morning and evening, 104° .

15th.—Temp., morning 104° , evening 104° .

16th.—Site of injection is a little swollen. Temp., morning 104° , evening 104° .

17th.—Several distinct rose-coloured spots in right axilla, chiefly about hair follicles. Site of injection more swollen and hard. Temp., morning 106° , evening 105° .

On the Pathology of the so-called Pig-Typhoid.

18th.—Other spots of hyperæmia on abdomen. They are about three lines in diameter, slightly elevated, and disappear on pressure. No general rash. Temp., morning 105° , evening $105\frac{2}{3}^{\circ}$.

19th.—Animal continues to feed well, but the skin and hair look rough. Temp., morning $109\frac{2}{3}^{\circ}$, evening $107\frac{1}{3}^{\circ}$.

20th.—No trace of any skin eruption; the small erythematous spots have faded. Temp., morning $105\frac{1}{3}^{\circ}$, evening 108° .

21st.—Site of injection remains hard. Temp., morning 107° , evening 106° .

22nd.—Eyes do not look so bright. Temp., morning 107° , evening 107° .

23rd.—No diarrhœa. No rash. Temp., morning 107° , evening $107\frac{1}{3}^{\circ}$.

24th.—Not so well. Eyelids glued together with secretion. Temp., morning 109° , evening 108° .

25th.—Has diarrhœa. A muco-purulent discharge runs from the nose. A very faint rash exists over abdomen. Temp., morning 107° , evening $107\frac{2}{3}^{\circ}$.

26th.—Diarrhœa profuse. Extremities cold, and the nose blue. Rash scarcely perceptible. Temp., morning $107\frac{2}{3}^{\circ}$, evening $108\frac{2}{3}^{\circ}$.

27th.—Very weak, and considerably emaciated. Position when standing and general appearance very characteristic; back arched, and the hinder extremities seem almost unable to support the weight of the body. The gait is tottering. Diarrhœa very severe, and the keeper noticed a little blood in the discharges. Several large purpuric blotches on the hind-legs. No cough. Temp., morning $106\frac{1}{3}^{\circ}$, evening 106° .

28th.—Extremities cold and nose blue. Emaciation has increased. Extravasations have extended, and are seen on the front-legs as well. Site of injection still hard. Inguinal glands a little enlarged. Temp., morning 105° , evening 103° .

29th.—No change. Diarrhœa continues. Temp., morning $103\frac{2}{3}^{\circ}$, evening 106° .

30th.—No extension of the extravasation. Dr. Buller examined the eyes, and reports the retinæ healthy. Temp., morning $106\frac{2}{3}^{\circ}$, evening $106\frac{1}{3}^{\circ}$.

October 1st.—Very weak; can hardly stand. Diarrhœa very profuse. Temp. 104° .

2nd.—Appears completely exhausted. Nose quite blue, and extremities very dark. Temp. 102° . Died in the night.

Post-mortem.—Kidneys look natural. In greater curvature of the stomach there is a diphtheritic-looking area about $1\frac{1}{2}$ in. in diameter, and near it some small patches of greyish-yellow infiltration. In the cæcum are several superficial plaques about the valve, one of which overlaps a patch of Peyer.

In the colon are twelve to fourteen isolated areas, involving only the mucosa, and showing no signs of separation.

Mesenteric glands swollen; some of them hæmorrhagic.

Experiment IV.

September 10th.—Mesenteric glands from diseased animal rubbed up with saline solution; m. xv. injected subcutaneously into right flank.

14th.—No change noticed. Temp. $103\frac{1}{2}^{\circ}$.

16th.—Temp. 105° .

17th.—A few rose-coloured spots noticed over sternum and epigastrium. No swelling at site of injection. Temp. 107° .

18th.—Nothing special noticeable except the hyperæmic spots on abdomen. Temp. $104\frac{1}{2}^{\circ}$.

19th.—Maculæ not so evident. Skin of ears congested. Temp., morning $109\frac{2}{3}^{\circ}$, evening $106\frac{1}{3}^{\circ}$.

20th.—No skin eruption visible. No swelling at site of injection. Temp., morning $106\frac{1}{3}^{\circ}$, evening 106° .

21st.—Animal feeds well. Temp., morning and evening, 106° .

22nd.—Temp. $107\frac{1}{2}^{\circ}$.

23rd.—No rash, but skin feels rougher than normal. Temp. 108° .

24th.—Is wasting, but continues to feed well. Temp. 107° .

25th.—Appears weaker, and has, for the first time, slight diarrhœa. Temp. $107\frac{2}{3}^{\circ}$.

26th.—Diarrhœa worse. Eyes look weak and the eyelids are covered with secretion. Extremities cold. Nose blue. Temp. 107° .

10 *On the Pathology of the so-called Pig-Typhoid.*

27th.—A faint rash perceptible on abdomen, and four or five papules, dark in colour and hæmorrhagic, are seen just below the ensiform cartilage. Extravasations are also seen on the skin of the hind-legs. Diarrhœa continues. Temp., morning $105\frac{4}{5}^{\circ}$, evening 107° .

28th.—Condition the same. Temp., morning and evening, 106° .

29th.—Very weak. Ecchymoses have not extended. Ears purplish. Temp. 106° .

30th.—Emaciation more marked, and general appearance very characteristic. Temp. $105\frac{1}{2}^{\circ}$.

October 1st.—Very weak. Diarrhœa excessive. Skin rough and harsh. Temp. 104° .

2nd.—Respirations a little laboured, but no evidence of Pneumonia. Temp. 104° .

3rd.—Very feeble. Can scarcely stand up. Extravasations appear to have extended on the legs, and a few are visible on abdomen. Temp. 101° .

4th.—In a moribund condition. Died in the night.

Post-mortem.—Nothing abnormal noticed in heart, lungs, liver, spleen, and kidneys. In mucous membrane of cæcum and first two feet of colon, there are numerous ecchymoses. In the rectum they are submucous and more uniform, infiltrating even the muscular coat. About the ileo-cæcal valve are confluent plaques, which extend through all the coats and thicken the wall. In the colon the patches are small and button-like.

Mesenteric glands swollen, and present extravasations in cortical parts.

Experiment V.

September 10th.—Portions of two intestines, containing numerous plaques, were minced finely and fed to a sow pig ten weeks old. The feeding was done with as little violence as possible, and I do not think the mucous membrane was abraded in the act.

13th.—Temp. 103° .

14th.—Appears quite well. Temp. $104\frac{2}{3}^{\circ}$.

15th.—Temp., morning $104\frac{2}{3}^{\circ}$, evening 104° .

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16th.—No change. Temp., morning 104° , evening $104\frac{3}{5}^{\circ}$.

17th.—No rash. Temp. $105\frac{2}{5}^{\circ}$.

18th.—Temp., morning $106\frac{1}{5}^{\circ}$, evening $106\frac{3}{5}^{\circ}$.

19th.—Has not fed so well, and begins to look ill. No trace of an eruption. Temp., morning 108° , evening 106° .

20th.—Fæces consistent, but a little bloody mucus noticed on the one which followed the introduction of the thermometer. Temp., morning $105\frac{1}{5}$, evening 106° .

21st.—Skin dry and harsh. Temp., morning $109\frac{1}{5}$, evening $108\frac{1}{5}$.

22nd.—No rash. No diarrhœa. Temp., morning $102\frac{2}{5}^{\circ}$, evening $104\frac{3}{5}^{\circ}$.

23rd.—Temp., morning 106° , evening $106\frac{1}{5}$.

24th.—Diarrhœa for the first time. Temp., morning 107° , evening $107\frac{4}{5}^{\circ}$.

25th.—Diarrhœa continues, but is slight. No rash. Temp., morning 107° , evening $107\frac{4}{5}$.

26th.—Is emaciated and weakened. The diarrhœa has been profuse. Temp. 108° .

27th.—Diarrhœa is better; stools soft but consistent. No ecchymoses. Temp., morning 110° , evening $108\frac{2}{5}^{\circ}$.

28th.—Condition much the same. Is not nearly so weak as the other pigs. Temp., morning $107\frac{4}{5}^{\circ}$, evening 107° .

29th.—Eyes are watery. Temp. 107° .

30th.—Diarrhœa is worse. Temp. $105\frac{1}{5}$.

October 1st.—Emaciation more marked. No rash. Extremities and nose slightly cyanotic. Temp. 106° .

2nd.—Feeds tolerably well, and looks much better than the animals inoculated on the same day.

3rd.—Gait staggering, and general appearance characteristic. Temp. 104° .

The animal remained in this condition, getting neither better nor worse, until the 10th, when it was bled to death. The extremities and ears were purplish, but not distinctly ecchymotic.

Post-mortem.—Heart, lungs, spleen, liver, and kidneys, present no apparent changes. In *cæcum* are a dozen or more circular patches, slightly depressed below the level of the mucous membrane. The surface is uniform, and they do not look as if

sloughs had separated from them. For an inch about the valve the mucosa is infiltrated with this greyish-yellow material. On the caecal lip of the valve are eight or ten miliary elevations with translucent centres, looking like small lymph follicles.

In the first foot of the colon are six irregular depressed plaques, which appear to be healing: in some there is a distinct line of demarcation between the patch and the mucosa; in others this is not marked, but the mucous membrane is apparently encroaching on the plaques. In the rest of the colon the patches are numerous, and in many of them a central slough is separating. There is no congestion of the mucous membrane.

That the contagion exists in the serum of the skin had been shown by Professor Axe, and verified by Dr. Klein, who had also induced the disease by inoculation with material from the intestines. He had not succeeded in producing the disease with the juice of lymphatic glands, as has been successfully done in Experiment IV. of our cases. In his experiment of feeding an animal with the diseased intestines, infection followed; but he explains it by supposing that the morbid matter gained entrance to the blood through scratches in the mouth. In Experiment V., above given, infection also followed: and I think there is sufficient ground for believing that the disease was induced by the absorption of the *materies morbi* from the intestinal tract, for the experiment was very carefully performed, with the express view of avoiding possible abrasion of the mucous membrane of the mouth. Lastly, the successful experiment with the caseous matter from the bronchial tubes demonstrates, for the first time, that the contagion is also contained in the lungs, and shows us one fruitful source of contamination, not only in the expired breath, but also in the mucus so frequently coughed up.

In this connexion I would refer to some admirable papers by Professor Claypole, of Antioch College, Ohio, published in the *Western Farmer*, Ohio; in which the infectious and contagious nature of the malady is abundantly proved. These are of special value, insomuch as an opinion prevails among many in the Western States that the disease is not communicable.

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SYMPTOMS.

These have already been so fully described by other writers, that I shall refer to one or two points only. In the first place, the temperature range is exceedingly irregular. The relation between the morning and evening temperature is not at all constant, and very generally there was a morning exacerbation and evening fall. In comparing the charts of the five cases, there is an entire absence of the typical curves of human Typhoid. Secondly, the cutaneous eruption in this epizootic was not so marked as in some which have been recorded. The ecchymoses were present in all the cases, with but one exception. These, however, though forming by far the most striking cutaneous lesions, are not regarded by Professor Axe as constituting the typical and characteristic eruption, which he states to consist in "small round raised spots of a faintly red colour." Such were certainly present in four of the five animals experimented upon, but I could not find them in a large number examined at Quebec in all stages of the disease; and I should like additional experience before concurring in the opinion that they constitute the specific eruption of this Fever.

And, thirdly, diarrhœa cannot be regarded as a constant symptom, for in more than half the cases examined the intestines contained consistent, sometimes hard, fæces.

PATHOLOGY.

The following is a summary of the pathological changes found in the nineteen cases which I have examined.

Skin.—In the majority of the animals definite changes were found in this structure. In the first place, the hairs had a rougher look and harsher feel than normally. The epidermis was frequently loosened in the form of fine scales. In four of the animals experimented upon, hyperæmia of the skin existed as a diffuse erythematous redness, which was in two instances general, in the others localized on the belly. During the second week there was, on four of these animals, an eruption of rose-coloured spots upon the abdomen and inner surfaces of the extremities. Some of these spots were flattened, slightly raised,

circular, about two to three lines in diameter, and disappeared on pressure; others were more pointed and papular in character, surrounding hair follicles, and situated upon hyperæmic bases. Not more than half a dozen of these were noticed on each animal, and it was only by careful inspection that they could be discovered.

In two instances scabs were formed, from beneath which pus exuded. The extravasations of blood into the skin, which form so remarkable a feature of the disease, were present to a greater or less degree in eighteen of the cases. Judging from the reports of other epizootics, I am inclined to think that the cutaneous affection was slighter than usual. The extravasations most commonly occurred about the abdomen and flanks, the inner surface of the legs, about the hocks, and the ears. They varied from small punctiform and petechial hæmorrhages up to extensive areas of infiltration, giving to the skin a uniformly deep-red or purplish-red colour, upon which the impression of the finger made no difference whatever. In several instances the whole skin was covered with irregular blotches, and on cutting in these areas it was seen that the hæmorrhages lay chiefly in the corium, though often in the subcutaneous tissue. The ears were perhaps most frequently involved in this process, presenting a deep purple colour. In none of the cases was the skin much swollen, nor in any of the forty or more diseased animals which I saw were there any of the local patches of gangrene or necrosis described by some authors.

Pharynx.—In one case there was extensive diphtheria of the nasal passages, pharynx, and larynx; and in another case there were ulcers on the mucous membrane of the cheeks and lips.

Stomach.—In nearly every instance this organ contained food. As a rule, the mucosa was pale; and in three cases plaques or patches similar to those found in the intestines were met with.

Intestines.—In fifteen out of the nineteen cases the intestines were affected; in three they were apparently healthy; while in one the mucous membrane was ecchymotic. In two only of the nineteen cases did the small intestines present evidence of disease, consisting in a slight degree of diphtheritic-like exudation on the mucous membrane,—once in the ileum and once in the

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duodenum. The mucous membrane was occasionally congested in places. Peyer's glands looked healthy.

The large intestine is the seat of the peculiar anatomical lesions of the disease, and these we shall briefly proceed to describe. The mucous membrane is sometimes congested; but this was found to be a most variable character, for frequently, even when extensively affected, the mucosa itself was pale, though the large vessels in the submucous tissue were usually full. Extravasations occurred in five or six instances; in Cases 5 and 17 they were remarkably abundant. In the former the colon presented a dark colour, from the presence of extravasation in the submucous coat, while the whole thickness and extent of the rectum was infiltrated with blood. In Case 17 the same condition of the rectum was found.

The specific intestinal affection consists in an infiltration of the mucous membrane, either in localized spots or extensive areas, and the production thereby of larger or smaller patches of necrosis, which may assume very varied forms, and in time separate, leaving definite ulcers. I will group together the different appearances which the lesions presented:—

1. A brownish-yellow infiltrate, very like diphtheritic membrane, involving only the superficial layers of the mucosa, but frequently very extensive. This form was met with in five or six of the cases, chiefly along the ridges of the cæcum and colon. On section, it extends for a couple of lines into the mucosa, and cannot be separated without removing portions of that membrane.

2. Small greyish elevated spots, ranging in size from a pin's head to a split pea, seated directly upon, and involving the mucosa to a variable depth; frequently the edges of the projecting spots overlap the mucous membrane. Others, older perhaps, are seen in process of separation, as small central sloughs, divided by narrow grooves from the mucosa, which may even be elevated about them.

3. Patches ranging in size from that of a threepenny-bit to a penny or larger, circular, flattened, intimately adherent to the mucosa, yellowish-grey in colour, sometimes dark in the centre, and usually presenting a concentric arrangement, resembling a

flattened-out rupia crust, or the cross section of a calculus. Sometimes these plaques are ovoid, and frequently two or three have coalesced. The concentric arrangement is their most peculiar feature, and is best marked in the larger ones, where a central spot can often be seen from which the process appears to have extended in zones. Some of the smaller ones differ from these, the surface being uniform and more prominent. On section, the patches show a yellowish-white colour throughout, and involve the coats of the bowel to a variable depth; some being confined to the upper part of the mucosa, others extending through its whole thickness; while others, again, involve the submucosa and muscular coats. They are firm and tenacious, not friable, resisting the scraping of a knife better than the mucous membrane itself.

4. Uniform involvement of large areas of the intestine converting the mucous surface into a yellowish irregular structure, like wash-leather, and in some instances extending through all the coats to the peritoneum, rendering the wall thick and inflexible.

5. In two cases most peculiar masses were met with in the colon, looking like warty excrescences, springing from the mucosa; they are oval, and lie transversely to the axis of the gut, encircling about three-fourths of the tube, and projecting from $\frac{1}{2}$ in. to 1 in. into the lumen. In the transverse direction they present a rounded concavity, while in the long axis of the bowel they are convex; the surface is dark or yellow-brown, and sometimes shows concentric lines. On section a firm greyish-yellow structure is disclosed, very dense, and involving all the coats to the peritoneum, which is puckered and retracted over the site of the attachment. One of these measured nearly $1\frac{1}{4}$ in. in thickness, and materially narrowed the calibre of the intestine.

Now all these lesions, though apparently different, are simply modifications of one and the same process. Between the first four, patches intermediate in character were met with, and in a larger experience I have no doubt connecting forms between three and five could be found.

Two facts are very remarkable about the condition of the intestinal lesions:—1. The absence of ulceration in most of the

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cases; and—2. The very slight hyperæmia or injection of the mucous membrane about the plaques. Not more than four or five distinct *ulcers*—*i.e.*, breaches or loss of substance in the mucosa—were met with altogether. In the few instances when the crusts, as they have appropriately been called, have separated, the bases and edges of the ulcers are formed by greyish infiltrated tissue. Nothing exactly corresponding to these appearances is met with in human pathology; the condition which most nearly resembles it occurs in the severer forms of Dysentery; and a short time ago, in a case of Pneumonia, I met with isolated rupia-like masses, infiltrated and projecting from the membrane of the colon, which somewhat resembled certain of these plaques.

Occasionally the solitary glands of Peyer, in the large bowel, were found swollen and distinct. In several instances numerous small elevated bodies, ranging in size from a pin's head to a split pea, were seen, usually with a small central depression and orifice. These closely resembled solitary glands, and, indeed, without microscopic examination, could not, I think, be distinguished from them. However, as will be subsequently stated, they have nothing to do with the glands of Peyer.

Histological Examination.—Fresh portions from a small intestinal plaque teased up in saline solution, show a finely granular stroma and numerous small cells, irregular in outline, solid, looking like fine nuclei, and about one-third the diameter of white blood-corpuscles. In thicker and older masses little can be seen but a granular *débris*, in which here and there the shrunken remains of corpuscles are noted. A study of sections of small areas the size of pin's heads, where the affection is beginning, shows that the process is confined to the mucosa. In the earliest stage at which I have been able to trace it, the crypts of Lieberkühn are filled with loosened epithelium, among which small corpuscles somewhat frequently occur. How the latter originate—whether from the epithelium or from the nuclei of the walls of the follicles—I cannot say, but in the next stage they form the predominant elements in the section. The affected area appears infiltrated with small round lymphoid corpuscles, closely aggregated, which destroy all traces of the normal con-

stituents of the mucous membrane. The muscularis mucosa is also infiltrated, and its elements separated. The submucosa at the same time contains numerous leucocytes.

In larger areas, the size of buttons, it can be seen that the densely-packed corpuscles have undergone a change; their outlines are less distinct, or altogether lost, and the section presents a homogeneous granular appearance. In thin sections, towards the surface, a laminated condition can be seen, depending, apparently, on thin translucent bars traversing the matrix, very like those met with in croupous and diphtheritic membrane. Comparing the appearance with specimens in human pathology, it most resembles the firm caseous material of the central part of a syphiloma. All the greyish-yellow plaques present great uniformity in this respect. Fine hairs and particles of food are not uncommonly attached to the surface. The deeper parts of the masses present appearances which vary with the depth to which the disease has extended. When of any size, the submucosa is usually involved, and the mass is then densely adherent to the muscular coat, the inner fibres of which are infiltrated with the small corpuscles above referred to. In many instances the entire thickness of the gut is attacked, and converted into a firm, dry, non-vascular structure, on the peritoneal surface of which alone is there any cellular activity.

Bacteria and micrococci were occasionally met with, but not in situations or numbers to be of great pathological importance.* None were seen blocking blood or lymph vessels. Several masses were noticed in Lieberkühn's crypts; most abundant in one in which a hair was found, the root of which was surrounded by groups.

The peculiar structures like solitary glands, noticed in some cases, demand a passing word. They have nothing to do with these bodies, but are *involutions* of the crypts of Lieberkühn, forming saccular cavities, communicating with the exterior by a narrow orifice which is usually plugged. In sections the contents of the sac very frequently fall out. They are similar, apparently, to what Cornil described as mucous cysts in a case of dysentery; but Kelsch, quoted by Birch-Hirschfeld,* first gave the correct

* "Lehrbuch der pathologischen Anatomie," 1877.

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Lymphatic System.—In ten of the cases, the mesenteric and retro-peritoneal glands were enlarged and of a deep-purple colour, owing to extravasation, chiefly into the cortical regions. In many sections the entire gland structure was infiltrated with blood, presenting on section a deep plum colour. In six cases they were swollen and tumefied, but not congested. In three of the cases in which there was no intestinal affection, they appeared normal.

In all of the cases in which the lungs were diseased, the bronchial and sternal, often the lower cervical glands, were swollen and congested.

Lungs.—After the intestines, the lungs appear to suffer most severely. They were more or less affected in ten of the cases three of these being unaccompanied by any intestinal lesions. The disease is a Broncho-pneumonia, involving the air-cells and finer tubes, which become obstructed, owing to an enormous proliferation of the cells and exudation into the air-vesicles. In this way lobules are transformed into firm hepatized masses, and by the extension of the process whole lobes are affected. A peculiar feature in this Pneumonia, and one which gave an odd appearance to the sections, is the blocking up of the tubes in the inflamed areas with firm, perfectly white, cheesy-looking matter, composed of closely crowded corpuscles, which have either been pushed up from the air-cells, or have originated in the inflammation of the tubes. In nearly every instance these cheesy or caseous casts of the tubes could be squeezed out in the inflamed areas. Some of the lobules, owing to the great increase and over-crowding of cells, become pale, soft, and friable, either being converted into a uniform cheesy mass, or breaking down into small abscesses.

Spleen.—No special affection of the spleen was noted, and it certainly exhibits in the pig a very different behaviour to that which we are accustomed to see displayed by this organ in the acute eruptive fevers of man. In only one instance was it swollen and enlarged—in the state commonly seen in Typhoid and other fevers, and described as Acute Splenic Tumour.

Kidneys.—The kidneys also are but slightly affected. In most of the cases the cortical region was pale, owing to slight swelling of the tubules, but nothing was apparent microscopically beyond a granular condition in the epithelial cells.

In the pelvis ecchymoses were noticed in several instances.

Liver.—In Case 14 the liver was swollen, soft, dark in colour, the cells very granular and fatty. In the rest of the cases there was little or no evident change in this organ. It looked, in fact, remarkably healthy, and on examination the fatty infiltration of the cells was found normal.

Blood.—Repeated examinations of this fluid were made in all the animals experimented upon, but no definite changes were observed. The red corpuscles tended to aggregate together into irregular clumps. No increase in the colourless elements; no foreign constituents.

CONCLUSIONS.

I. The so-called Pig-Typhoid is a disease *sui generis*, presenting anatomical and clinical features distinct from any other affection.

II. It presents no analogies, either pathologically or clinically, with Typhoid Fever in man.

III. Neither has it any affinity with Anthrax, as claimed by some Continental writers.

IV. If we take the intestinal lesions as characteristic, the disease must be regarded, with Dr. Murchison, as dysenteric in its nature; although the cutaneous and pulmonary affections, as well as certain of the clinical features, meet with no parallel in human dysentery.

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Ueber die Entwicklung von Blutkörperchen im Knochenmark bei perniciöser Anämie.

Von Dr. Osler, Prof. a. d. McGill Universität in Montreal.

Der Fall, welcher außer geringer Schmerzhaftigkeit des Brustbeins nichts Besonderes darbot, betraf ein 20jähriges Mädchen. Das Blut zeigte viele Microcyten und große unregelmäßige nicht kernhaltige gefärbte Zellen, keine Elementarkörnchen (M. SCHULTZE). Auf Letzteres weise ich besonders hin, weil dies bereits der 5. Fall ist, in welchem ich ihr gänzlich Fehlen bemerkte, während sie bekanntlich bei anderen anämischen und cachectischen Zuständen reichlich vorkommen. In der Leiche war außer mäßiger Fettentartung von Herz, Leber und Nieren keine Abnormität der Organe nachweisbar.

Das Mark des rechten Femur, Sternums und der Rippen war von galliger Consistenz, nicht fettig, tief rot gefärbt, genau so wie Milzpulpa. Dasjenige des Radius war im Centrum fettig, nach den Endpunkten hin rötlich.

Die fortgesetzte mikroskopische Untersuchung (Hartnack IX. und XVI.) zeigte folgende Formen: 1. gewöhnliche grobkörnige mit deutlichem Kern versehene Markzellen von 0,01000–0,01335 Mm.; 2. kleinere Markzellen von 0,00411–0,00588 Mm., deren Protoplasma weniger körnig, als bei den größeren Zellen war; 3. farblose Zellen von der Größe der gewöhnlichen Markzellen und noch darüber mit homogener Substanz und feinkörnigen Kernen. Dies sind keine in Bläschen umgewandelte Markzellen; das Protoplasma ist hell, durchscheinend gleich dem Ectosarca von Amöben. Der Unterschied zwischen ihnen und den hier und da im Mark vorkommenden Bläschen ist deutlich. Die Kerne sehr groß, oft undeutlich, aber mit körnigen nicht scharf abgegrenzten Rändern. Sie befanden sich zwischen den großen Markelementen und maßen 0,01333–0,02333 Mm.; 4. kernhaltige rote Blutkörperchen großer Zahl (8–10 in einem Gesichtsfeld von IX. Oc. 3). Sie zeigten folgende Verschiedenheiten: a) äußerst blasse Form, von den unter 3. beschriebenen Formen unterschieden durch Färbung des Protoplasmas, die oft so fein war, dass sie nur durch Vergleichung mit ganz farblosen Körperchen entdeckt werden konnte; einige waren selbst noch größer, als die eben beschriebenen Formen. Abgesehen von der Färbung konnte man

keinen Unterschied entdecken und sich leicht überzeugen, dass es keine Bläschen waren, die durch Imbibition sich gefärbt hatten, denn das Protoplasma zeigte ein gleichmäßiges, dunkelkörniges Aussehen, und zeigte außerdem sehr ausgesprochen jene den roten Körperchen so eigentümliche Biegsamkeit und Elasticität. Ab und zu fanden sich einige wenige Körnchen in dem Zellkörper. Die Kerne waren groß, oft 2, zuweilen 3 in einer Zelle. Einige der Kerne hatten „dumb-bell“-Form, sie waren offenbar in Teilung begriffen, denn die Kerne waren schon geteilt. Ihr Durchmesser war 0,015—0,025, der der Kerne 0,00833—0,01333; b) tief gefärbte Körperchen, die gewöhnlichen „Uebergangsformen“. Die Mehrzahl derselben war groß, zwischen 0,01—0,01941 Mm., die Kerne körnig, excentrisch, aber selten aus dem Zellkörper hervortretend und im Mittel 0,0047—0,00941 messend. In einigen waren statt des Kernes einige undeutliche Körnchen und in 2 tiefgefärbten, welche 0,015 bis 0,01838 maßen, konnten keine Kerne entdeckt werden; c) viele dieser tiefgefärbten Körper waren kleiner, rund oder etwas elliptisch mit bläschenartigem Kern, der in machen doppelt conturirt erschien. Gelegentlich waren 1 oder 2 kleine scheibenförmige Körper im Innern dieser Zellen zu sehen, zuweilen im Centrum des bläschenförmigen Kernes. Der Durchmesser dieser Formen betrug 0,01, der der Kerne 0,00500.

Oft war es unmöglich, zu erkennen, ob ein Kern in diesen Körperchen, welche zum Teil schwer von den größeren gewöhnlichen Blutkörperchen sich unterscheiden ließen, vorhanden war oder nicht. Der Durchmesser derjenigen, in welchen kein Kern erkennbar war, schwankte von 0,00824—0,00941; 5. gewöhnliche rote Blutkörperchen, viele groß elliptisch oder sehr unregelmäßig gestaltet, jedoch immer abgeplattet, von mäßiger Färbung, 0,0047 bis 0,01 messend. Microcyten in geringer Zahl und weniger, als im Blut selbst, oder in der Milz, 0,00176—0,00353 messend; 6. Zellen, die rote Blutkörperchen enthielten, in mäßiger Zahl.

Myeloplaxen fehlten gänzlich, ebenso die CHARCOT'schen Krystalle, selbst als das Mark schon in Zersetzung überging.

Bei keiner früheren Untersuchung von Knochenmark im gesunden oder kranken Zustande bin ich einer solchen Reihe von Entwicklungsformen begegnet, wie hier. In 2 anderen Fällen perniciöser Anämie, in 2 Fällen von Leukämie, 1 von Pseudo-Leukämie, und 2 von tuberculösen Affectionen (Phthisis und tub. Peritonitis) war das Mark hyperplastisch und zeigte stets mehr oder weniger zahlreiche kernhaltige rote Körperchen, aber die unter 3. und 4c. oben beschriebenen Formen konnte ich nicht entdecken. Sie scheinen zwischen Markzellen und kernhaltigen roten Zellen einerseits und letzteren und gewöhnlichen roten Blutkörperchen andererseits zu stehen. In der Tat stimme ich vollständig NEUMANN¹⁾ bei, wenn er sagt: „Die Beziehung der kernhaltigen roten Blutzellen als „Uebergangsformen“ zwischen farblosen und farbigen Elementen involviret aber eine Hypothese über ihren Ursprung, in Bezug auf welche ich

¹⁾ Arch. f. mikr. Anat. XII. S. 796.

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mich früher vielleicht mit zu großer Zuversichtlichkeit getäusert habe und bei deren Beurteilung neuere Untersuchungen mir größere Reserve auferlegen.“ Und neuerdings sagt derselbe²⁾, dass es nicht unwahrscheinlich ist, dass die Entwicklung der kernhaltigen roten Körperchen unabhängig von den farblosen Markzellen sei — ein bemerkenswertes Zugeständniss mit Rücksicht auf frühere positive Angaben über denselben Punkt³⁾.

Die Befunde im vorliegenden Fall begünstigen die Ansicht, dass eine Umwandlung der farblosen Markzellen in rote Blutkörperchen stattfindet, welche durch Degeneration der Kerne und Verdichtung des Zellprotoplasmas schliesslich in die gewöhnlichen Blutscheiben umgewandelt werden. Ich halte dies wenigstens für den einzig vernünftigen Schluss, der aus der beschriebenen Reihe zu ziehen ist.

Die Bedeutung dieser Veränderungen aber für die pern. Anämie ist noch keineswegs klar. Ist die Veränderung des Marks Ursache und Ursprung der Krankheit und giebt es wirklich Fälle von Pseudo-leukämia medullaris? Diese Fragen werden erst mit fortschreitender Erkenntniss der Function des Knochenmarks und seines Einflusses auf das Blut beantwortet werden.

²⁾ Berliner klin. Wochenschr. 1878, No. 10.

³⁾ Arch. der Heilk. X.

XXIII

Re-printed from "The Canada Medical & Surgical Journal," December, 1879.

CROUP OR DIPHTHERIA, WHICH?

BY WILLIAM OSLER, M.D., M.R.C.P., LOND.

Professor of the Institutes of Medicine, McGill University; Physician to the Montreal General Hospital.

On Monday morning, Nov. 10th, 8.30 a.m., I was hastily summoned to the Infants' Home by a message that a child was dying. On arriving, I found Fritz, a well grown boy of $4\frac{1}{2}$ years, in a state of urgent dyspnoea, and rapidly becoming cyanotic. I was informed that the child had had a slight cold on Sunday, but had been about, and had taken his food as usual. In the evening the matron noticed that he was somewhat restless in his cot, breathed rather heavily, and had a "croupy" cough. Towards morning he became worse, and he was put in a warm bath, and had mustard applied, with considerable relief. At 7 a.m. he got worse, and they again tried the ordinary remedies, but without affording any relief. I found him in the state above mentioned; breathing very laboured; cold sweat on the forehead; skin livid; extreme restlessness; and on inspection of chest, there was seen retraction of lower zone and epigastrium. The child had had a somewhat similar attack about three months before, and another last winter, and has always been regarded as "croupy"—i.e., on taking cold had a cough with a peculiar "bark" or ring. A younger brother died of croup. Seeing that no time was to be lost, I got Dr. Shepherd to perform tracheotomy, which afforded prompt relief; the breathing became quiet, and the natural colour was restored. Pulse full and strong. When the trachea was opened, we could see quite plainly a thin layer of false membrane on the posterior wall. After the operation, the fauces

were thoroughly inspected, and appeared natural ; no swelling ; no exudation. There is no enlargement of cervical glands. For a couple of hours the child was easier. When seen at 1.30 p.m., respirations were hurried, 60 per min.; pulse, 140 ; and temperature high. At 5 p.m., condition the same. Tube was cleansed of muco-pus, but respirations continued very rapid. Colour good. Takes milk well. At 9 p.m., very restless ; respiration, 55 ; pulse over 140 ; skin hot and dry. Has passed a small amount of urine, but it had not been kept. Has been vomiting a good deal. Mr. Rogers kindly watched the child during the night ; it was restless at times, and kept feverish, but seemed, on the whole, somewhat easier. At 9.15 a.m. was weaker : pulse almost uncountable ; respirations over 60 ; temperature, 105°. Tube is clear. Unfortunately the nurse had, in spite of instructions, failed to keep any urine. Death occurred at 1.30 p.m.

Autopsy.—Face suffused ; lips and finger-tips livid. In thorax, lungs do not collapse. Right side of heart and great veins gorged with blood. Pharynx, larynx, trachea and lungs removed together. Uvula and soft palate somewhat suffused. Tonsils not enlarged, and of good colour : at upper and back part of left there is a small greyish-white patch, 2×3 m. ; near it are two open follicles, with a little exudation in them. In right organ, three follicles are filled with greyish-white soft material. No membrane on pillars of fauces, or on upper surface of epiglottis. Entire larynx is filled up with a greyish exudation, which lines the under surface of epiglottis, the true and false chords, and the arytenoid cartilages, completely closing the *rima*. It can be lifted as a definite membrane, tolerably compact, but loosely composed on its surface. Thickness about 2 m. From the larynx it extends into the trachea as a continuous sheeting as far as the incision. The tissue beneath it is deeply congested and somewhat granular-looking. From the lower margin of the tracheal wound, it extends down the tube into the bronchi, and can be followed in the latter to branches of the third degree. The membrane here is not so consistent, and is more difficult to remove as a continuous sheeting. Mucosa

beneath deeply injected. *Lungs*, crepitant in front, dark-coloured, collapsed and congested behind. At hinder part of right upper lobe the tissue is very firm, and in spots granular—pneumonic. *Heart*: right chambers gorged with blood and jelly-like clots; great veins distended. *Spleen* a little enlarged; pulp not very soft. *Kidneys* much congested; on section, blood drips from the surface. No special alteration of substance noticed. Nothing of note in gastro-intestinal tract.

Microscopic examination of grey patch on right tonsil showed a network of fibrils, with numerous round cells, leucocytes, and granular débris. The exudation in follicles of left tonsil appeared softer, and was made up chiefly of very closely-packed corpuscles. In the membrane from the larynx the same elements were found: meshes of fibrin-fibrils, large and loosely arranged, with round cells and epithelial flakes. Here and there groups of micrococci were met with, and some of the cells contain isolated forms. They are not, however, specially abundant, and the same elements occur in numbers on the fur of the tongue. The kidney epithelium was granular, and in cortical tubes swollen. No micrococci found. The capillaries were very full.

Remarks.—Croup or diphtheria, which? I believe it to be the former, for the following reasons: (1.) The sporadic nature of the case; the child had not been exposed to contagion, and no cases subsequently developed in the Home, although the conditions for the spread of the disease are most favorable.* (2.) The mode of attack, and locality first affected. Up to a couple of hours prior to the first symptoms the child appeared in his usual health, though suffering from a slight cold. The difficulty in breathing came on very early, and was the prominent feature throughout; the larynx was primarily affected. Before the effect of the chloroform had passed away after the operation, the fauces and tonsils were most carefully examined by Drs. Ross, Shepherd and myself, and no membrane seen, not

* Up to the time of the operation the child was in the same room with about a dozen children, from 3 to 5 years of age. Subsequently, he was isolated.

even injection. (3.) The absence of swelling of the neck and fetor of breath, symptoms rarely missed in severe cases of diphtheria. (4.) The situation of the exudation ; primary laryngeal diphtheria is very uncommon. On the other hand, the slight extension in the tonsils in this case does not invalidate the croup view, as in this disease the membrane may also occur in the fauces. The extension of the membrane into the tubes does not tell much either way ; it is seen in both affections. In 17 cases of diphtheria, of which I have *post-mortem* records, extension of the membrane in the trachea and bronchi occurred in eight of them. (5.) The absence of signs of septic poisoning at the *post-mortem*. The blood was clotted and natural-looking, no staining of walls of vessels or of tissues about them ; only the usual conditions met with in death from asphyxia. (6.) The absence of micrococci in internal organs, especially the kidneys. Their presence in the exudation in larynx does not go for much, when the same elements occurred on tongue. They were not in the same numbers as in diphtheria, in which they swarm in the membrane. (7.) The fact that the child had been subject to "croupy" attacks, two of which were accompanied with dyspnoea and lividity. A younger brother also died of croup.

Croup I believe to be a non-specific inflammatory affection of the laryngo-tracheal tract, accompanied with a membranous exudation. It is never contagious, is usually sporadic, and rarely occurs in adults. Kills by asphyxia ; never by blood-poisoning. Is a local disease, the constitutional manifestations being those of impeded respiration ; is never followed by paralysis. There is never fetor of breath, or swelling of glands of the neck. To this picture the above case corresponds in its essentials.

CASE

OF

OBLITERATION OF VENA CAVA INFERIOR,

WITH

GREAT STENOSIS OF ORIFICES OF HEPATIC VEINS.

BY

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(From the *Journal of Anatomy and Physiology*, Vol. xiii.)

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1879.

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CASE OF OBLITERATION OF VENA CAVA INFERIOR.

THE causes of obliteration of the inferior vena cava in the great majority of cases have been either compression or the extension of thrombi from other veins. A few cases are on record in which the closures could not be referred to either of these causes, and have led some authors to conclude that the vena cava may be the seat of a primitive phlebitis. The occlusion, also, in the majority of instances has affected the vessel below the entrance of the hepatic veins, the cases of Baillie¹ and Reynaud² being the only ones in which these are reported to have been involved.

The following case bears, in an interesting manner, upon both these points, inasmuch as the obliteration can neither be traced to compression nor to the extension of a thrombus, and had probably lasted some years, the vein being converted into a firm fibrous cord; and the hepatic veins, where they enter the cava, are so far involved as to be reduced to the condition of insignificant orifices. In addition, the case presents features of anatomical and clinical interest.

For the following clinical notes I am indebted to Dr Johnson Alloway, of this city, under whose care the patient was during his last illness:—

¹ Quoted by Hallett, *Edinburgh Med. and Surg. Journal*, vol. lxi. 1848.

² Quoted by Hallett, *l. c.*; and Peacock, *Medical-Surgical Transactions*, vol. xxviii.

History.—J. G., æt. 24. "Mother died of cholera, father of ague. Brothers and sisters (two of each sex) strong and well. Has never been a very strong man, always pale and anæmic. When a child, was backward in his nutrition, and always considered the delicate member of the family. Was originally a carpenter by trade, but for the past three years has been employed as a packer in a warehouse, a position where he had a good deal of hard work. Has never had syphilis. The only serious illness of which there is any record is an attack of pleurisy about thirteen years ago, which very nearly proved fatal; side not known. Has suffered from piles. For some years past his legs have been more or less swollen, but he could not say exactly for how long, nor had he suffered any serious inconvenience. During the past three years I have attended him at intervals for dyspepsia and diarrhœa, and once for a severe attack of facial neuralgia.

"On December 12th, 1878, he came to me complaining of diarrhœa and intense pain in the lower bowel during passage of stools. On examining rectum, mucous membrane much congested and veins enlarged. Two weeks ago, when running up stairs, a varicose vein burst in one leg, and since then he has worn an elastic stocking. For nine days he was confined to the house with symptoms of gastric and intestinal catarrh, only occasional vomiting; once or twice a little blood was noticed—never any blood in the stools. On the 21st (Saturday) he was so much better, that I told him he might go to work on Monday. He was, however, not so well on the following day, and I was sent for, but could not go. On Monday I found that he had had a return of the symptoms, and he complained of his belly being swollen. On examining him (it was for the first time), I found a small amount of fluid in the flanks, the legs were a good deal swollen and pitted as high as the hips, the cedema extending round to the lumbar region. During the next few days the ascites increased rapidly. A distinct *bruit* was heard over the heart, and is described in a note below ¹ by Dr Howard,

¹ "A loud presystolic murmur exists over a large area, of maximum intensity, in the lower sternal region, near xiphoid cartilage; it is very distinct just inside of left nipple, and faintly audible in left lateral region, and distinctly audible in left vertebral groove, opposite the xiphoid cartilage. The murmur is not audible at the base of the heart where the cardiac sounds are normal. Apex beat at nipple

who saw the patient in consultation with me. At this time he had the appearance of a man suffering from cardiac dropsy. By the 28th the abdomen measured 41 inches round the umbilicus, and to give relief, paracentesis was performed, and about eight quarts of serum removed, of a greenish hue. The urine during the early part of the illness was diminished in amount, not more than 8 to 10 oz. in the twenty-four hours, but afterwards the quantity rose to about 30 oz. daily. On four separate occasions it was tested for albumen, but none was discovered. The diarrhoea had ceased, but he occasionally vomited. On January 6th, nine days after the first tapping, the fluid had reaccumulated—measurement at umbilicus, 42 inches. Veins of abdomen distinctly marked, and could be traced like rivers on a map; swelling of the legs not so great. He was again tapped, and over ten quarts of fluid removed. After the operation the margin of the liver could be felt—it was extremely hard. He complained of no special pain during the illness, only of the distress caused by the fluid. Deep pressure over the pancreas was painful, and it was thought that a hard mass could be felt in this situation. The fluid quickly reaccumulated. On the 12th, there was considerable pain over the distended abdomen; symptoms of collapse supervened, and it was thought that peritonitis had set in. The heart's action gradually failed, and he died on the 15th. The swelling of the legs had diminished greatly during the last days of his illness. After death, for the convenience of the friends, the belly was tapped, and about eight quarts of slightly turbid fluid removed."

Autopsy, twenty-five hours after death. Body that of a man rather under the average size. Very little fat, but not emaciated. Skin of upper part of thorax and in dependent regions livid from *post-mortem* discoloration. Belly is flat and flaccid, about two gellons of fluid having been removed after death. Legs moderately swollen; veins distinct and prominent, but not remarkably enlarged—some are varicose. Scrotum and penis slightly swollen. Superficial veins of abdomen enlarged to a line, rhythm and impulse normal. Jugulars neither distended nor pulsating. While quite puzzled as to the source and cause of the murmur, I supposed it to be due to mitral valve disease. No murmur existed along the abdominal aorta." Dr Alloway states that after the tapping the murmur diminished or entirely disappeared.

moderate degree—scarcely so evident, perhaps, as they were during life, according to the description of the medical attendant.

Abdomen.—Entire peritoneum of an intensely livid red colour, from injection of capillaries and veins. 5xxx of turbid, brown-coloured fluid remain in the flanks, and a few flakes of lymph float in it. The general surface is, however, smooth and glistening—not rough and dimmed, as in peritonitis. The walls of the intestines are relaxed, sodden, and heavy, and the mesentery is also very thick.

Thorax.—No fluid in pleuræ; a few adhesions at right apex.

Heart, of average size. All the chambers contain coagula; those in the ventricles colourless, firm, closely interlaced with columnæ carneæ, and extend into the arteries. Right auricle distended with a firm gelatinous clot, which extends into both cavæ. Auriculo-ventricular orifices not dilated; all the valves healthy. Muscle substance of good colour. Aorta normal—no atheroma.

Lungs, crepitant throughout; collapsed at bases, otherwise healthy.

Spleen, double the normal size, very firm, and cuts with great resistance. Capsule not thickened. Pulp dense, trabeculae and vessels prominent.

Kidneys are large, exceedingly dense and hard to the touch. Capsules peel off with difficulty, portions remaining on the organs. On section, vessels of both cortices and medullæ very full, and the veins about bases of pyramids remarkably large.

Ureters and bladder natural.

Pancreas is unusually dense and firm (so much so, that when first examined it was thought to be the seat of scirrhus). On section, the induration is found to be due to the great increase of fibrous-tissue about the acini.

Liver is increased somewhat in size, feels heavier than natural, and is very hard and firm to the touch. Surface is not perfectly smooth, but is mapped out into irregular slightly-projecting areas, which are most distinct towards the anterior border. The capsule is not thickened, nor are there any cicatrices. About the anterior half of the organ, on both surfaces, the capsule is studded over with innumerable small, semi-opaque bodies, ranging in size from a grain of sand to a millet-seed.

They are little fibrous outgrowths from the capsule, and presented a remarkable appearance on the dark brown surface of the organ. The substance cuts with resistance, and the lobules are seen to be very distinctly marked, of good colour, not fatty, and the central veins in many unusually prominent. There is considerable excess of fibrous tissue in the organ, chiefly about individual lobules and along the course of portal canals. A striking feature on the section is the number and size of the hepatic veins.

Gall-bladder is full of bile; ducts natural, common bile-duct large and patent.

Stomach large, and contains the remains of food, together with a thick, dark-coloured mucus. The whole lining membrane is of a deep red colour, about the cardia almost black, from the over-filled capillaries and veins. In the pyloric region there are several large areas of a dark slate-grey colour, and ten to twelve small superficial erosions, with dark bases. The membrane appears of average thickness. Sub-mucous veins are enlarged and prominent, particularly on the lesser curve and about the cardia.

Small Intestines very dark in colour; walls relaxed and sodden, but the serous coat is smooth. Mucosa is uniformly dark and congested.

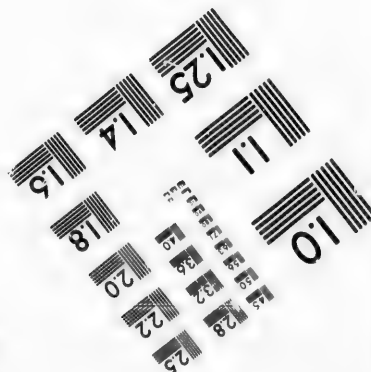
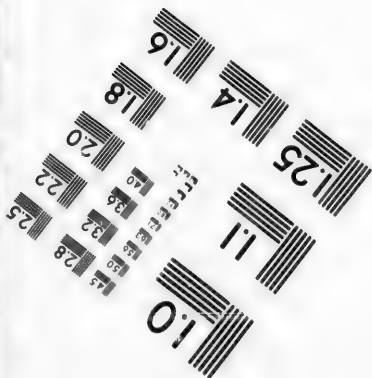
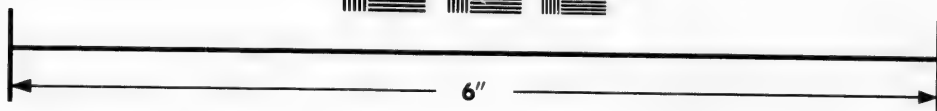
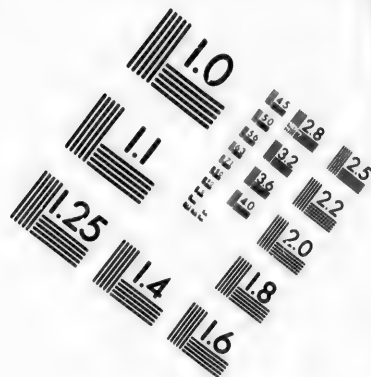
Large Intestines contain a small quantity of faeces; walls are dark, mucous membrane congested. Numerous large veins about the *caput cæci* and along the sigmoid flexure and rectum.

Mesentery is heavy and coarse-looking. Peritoneum smooth, not so dark as over bowels. On section, veins large; fat everywhere traversed by small vessels, and the lobules much more distinct than usual. The glands are dark in colour, but not apparently enlarged.

Venous System.¹—Superficial veins of abdomen and thorax not specially prominent, not nearly so much so as in many cases of cirrhosis. Veins of the legs enlarged, a few varicose, but here also the distension was by no means remarkable.

¹ The unfavourable circumstances under which the *post-mortem* was performed did not permit of so thorough an examination of the veins as might have been desired, nor was it until towards the close of the inspection that the nature of the lesion was suspected. The parts from which the sketch was taken were removed and subsequently dissected.





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Vena Cava inf.—From the right auricle to the diaphragm natural-looking, and filled with a large consistent clot. Orifice looks of normal size. *Intima* is clear, and the other coats are not thickened. At the diaphragm this portion of the vein terminates in a sort of *cul-de-sac*, the floor of which is made up of cicatricial tissue, and on either side two small orifices open into it—the hepatic veins. From this point to the entrance of the left renal the vein is represented by a dense fibrous cord, 62 mm. in length, narrow at the middle (10 mm.), wider at either end, just above the renal measuring 18 mm. The central part of the cord lies between the lobus Spigelii and right lobe, and has tolerably firm adhesions to the liver substance, while at either end the connections are not so close. On section it presents a dense, fibrous aspect, with a peculiar greyish translucency, and no trace of blood-colouring matter. It is solid throughout, and apparently composed of bundles of connective-tissue. A tiny vein penetrates it from below for the distance of 12 mm. The surface of the right lobe in the neighbourhood is rough and thickened, but not more so than is usual at the site of attachment to the diaphragm; the tissue of the lobus Spigelii is perfectly natural-looking, even to the very margin of the cord. The obliteration terminates at the left renal, and below this the cava measures 40 mm., and then gradually widens to the bifurcation, above which it measures 70 mm. in circumference. The vessel is opaque, the walls three or four times the normal thickness, and externally marked by a longitudinal striation, which is specially distinct at the upper part. The *intima* is thickened and rough, and above presents one small calcareous plate; in the middle portion elevated lines run in different directions, giving a reticulated appearance to the membrane, while at the bifurcation there are several sharply-circumscribed atheromatous swellings. The vessel presented the following branches:—

Left Renal, which forms a large trunk, 30 mm. in circumference, with thick, opaque walls. It enters the cava somewhat obliquely.

A vessel, nearly as large as itself, enters at the posterior superior border, but, unfortunately, its further course was not traced. A second still larger branch enters from below, at right angles, and is described hereafter.

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Right Renal, not so large as the left, enters the cava nearly at the same level.

Right Spermatic, forming a large branch, 22 mm. in circumference, which empties a little below right renal.

Lumbar, consisting of three or four greatly dilated vessels. Only three orifices were found in the posterior wall of the cava, but the veins on either side may have united, as is not infrequently the case. These branches as they pass out over the vertebrae are remarkably large; the little finger could be readily inserted for some distance into them.

Iliacs, considerably dilated, the left branches rather more than the right.

A large vein, almost equalling in size the vena cava (measuring 32 mm.), extends along the left side of the aorta from the renal to the iliacs. Above, it enters the left renal just before that vessel crosses the aorta, below, it divides into two branches, one of which, the smaller, somewhat horizontally placed, enters the left common iliac, just below the bifurcation of the cava, the other passes down for a short distance and opens into the external iliac. Posteriorly, this vessel receives four moderate-sized veins.

Pelvic Veins are all enlarged and prominent, particularly those about the rectum—haemorrhoidal plexus.

Diaphragmatic Veins very much distended, forming a close network with the veins in the coronary and lateral ligaments of the liver, and also with those of the lesser curve of the stomach.

Esophageal Veins form a close plexus, which receives many large veins from the cardiac end of the stomach, all the loose connective-tissue about the mediastinum above the diaphragm is exceedingly rich in venous branches.

Azygos Major is immensely distended, equalling the vena cava inf. in size, measuring about the centre of its course 62 mm. in circumference. The walls are very thin, but healthy, and the diameter increases a little near the sup. cava, into which it opens by a large orifice, admitting readily the index finger. The intercostal veins, particularly the lower ones, are very much enlarged.

Azygos Minor is also large, but not more than one-fourth the size of the azygos major, into which it empties at the usual site. Unfortunately, its connections with the lumbar could not be traced.

Int. Mammary Veins are moderately enlarged.

Vena cava sup. and its branches—so far as they were traced—present nothing unusual. It did not appear much dilated where it enters the auricle.

Portal System.—Mesenteric vein and all its branches are distended with blood, even to the smallest vessels. Splenic vein also large. Portal vein measures 33 mm. in circumference, right branch admits the little finger, walls healthy. Branches in the liver do not appear much dilated.

Hepatic Veins.—In many of the lobules the *venæ centrales* are distended, and one of the most striking features on the cut section is the number and prominence of the hepatic veins of all sizes. Two main branches, one in each lobe, pass obliquely towards the cava, enlarging greatly in their course, and finally open by the two small orifices already referred to. Immediately behind the openings the veins are much dilated, but the walls are thin and not atheromatous. The right orifice measures 9 mm. in circumference, and its margins are formed by fresh-looking connective-tissue, which at the posterior part forms a sort of imperfect valve. The opening of the left vein is smaller, 7 mm., and situated at the bottom of a small funnel-shaped depression of the cava.

Microscopical Examination.

Obliterated Vein.—Transverse sections of the fibrous cord show (1), an external zone, 3 mm. in width, separated from the central part by a well-marked line of elastic tissue. This, apparently, represents the vein wall, and is made up of fibrous and elastic tissue, the former in coarse bundles, often enclosing irregular areas, which appear to contain transversely-cut muscle bundles; the latter in fine fibres, running in different directions and forming at the inner part a dense interlacement. (2) The central portion, composed of closely-compressed bundles of connective-tissue, which even in thin sections, do not present any evident structure, but are homogeneous, staining deeply and uniformly in carmine. In places it is more loosely arranged and distinct, fine fibrils can be seen, often interspersed with fine colourless granules. No crystals or melanin grains, nor are there any traces of an old blood-clot. The cut ends of a few small vessels are seen on the sections.

Liver.—Sections under a low power have a very porous appearance from the number of enlarged veins of all sizes up to half a millimetre. The majority of these are branches of the hepatic vein, but some with thick walls are portal. The intra-lobular veins do not appear so much enlarged, proportionately, as the larger branches. Narrow zones of fibrous tissue surround the lobules, in places broad bands are seen. The degree of cirrhosis is not appreciated until thin sections are examined, when it is seen that the connective-tissue within the lobules is very much increased, extending between the columns of cells and surrounding small groups or even isolated cells. It did not seem more advanced in the central parts of the lobules than at the periphery. The liver cells are granular, not fatty, but in many places compressed and atrophied. In the vicinity of the larger vessels they contain pigment. The spaces between the cords of liver cells appear large, but not to the same degree as in many cases of red atrophy of this organ.

Kidneys.—Interstitial tissue between the tubules much increased in thickness. Renal epithelium a little more granular than normal, but not fatty. Tubules in cortex not swollen or obstructed. The condition of the Malpighian bodies is the most striking feature in the sections, fully one-half of them being atrophied. The healthy ones are large, capsules somewhat thickened, capillary tufts prominent, and individual loops dilated. The atrophic ones are not one-third the size of the others, stain deeply in carmine, and are surrounded by a very thick fibrous sheath, with the fibres concentrically arranged. The central tuft is reduced to a granular or homogeneous body, often containing oil drops. They can be seen in all stages of degeneration. The small arteries are thickened, particularly in the middle coat.

Pancreas.—The excessive induration is due to an unusual amount of fibrous tissue between the acini; the cells do not appear atrophied.

REMARKS.—The question naturally arises in reading the report of this case, Could the obliteration have been congenital? The absence in the history of any acute illness which may be supposed to correspond to the date of occlusion, and the general backwardness of nutrition, favour such a view, but there is nothing else

to support it. Whatever may have been the primary cause of the obliteration, it must have led to the formation of a thrombus, the final transformation of which is represented by the cord-like structure described above. In the absence of any source of compression, or of any pathological state in the branches, we are driven to the conclusion that the initial changes have been local, and confined to the part of the vessel affected. It is difficult, however, to conceive of a localised phlebitis in a trunk like the inferior cava, and still more of an acute process, the effects of which would have been limited to the short distance found occluded. A chronic obliterating endophlebitis is not, so far as I know, recognised. In the remarkable case reported by A. Robin,¹ the first symptoms followed violent and prolonged exertion, being ushered in with "fever, delirium, increase in size of abdomen, with violent lumbar and abdominal pain." There is no history, in the case under consideration, of any severe illness except pleurisy, during which, so far as can be ascertained, there was no dropsy. The only possible connection with this attack might have been copious ~~right~~ sided exudation, with great dislocation of the heart, when the inferior cava might have got a twist (Birch-Hirschfeld).

From the state of the vein at the site of the obliteration we can infer that the obstruction has been of some duration, but how long it is impossible to conjecture, for such a dense, fibrous cord, when once formed, might remain unaltered for years. The atheromatous and thickened state of the cava below the renals must be regarded simply as an expression of the strain to which this part of the vein had been subjected. The great increase in the connective-tissue of the liver and other organs is what might have been expected, and is in itself evidence of the long-standing nature of the obliteration.

The stenosis of the hepatic veins has affected the portal circulation in much the same way as ordinary cirrhosis, interfering with the free flow of blood through the liver, and keeping the abdominal viscera in a condition of chronic congestion, the effect of which is very evident in the induration of the spleen and pancreas. The state of the liver is of interest as showing, in an exaggerated degree, the effects of congestion in the hepatic

¹ *Archives de Physiologie*, 1874, p. 897.

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veins, presenting also certain peculiarities. The development of fibrous tissue is very much greater than is usually met with in the most chronic cases of heart disease or emphysema, amounting to a tolerably advanced cirrhosis. The new growth is much more intralobular than in the common form of this disease. Contrary to what might have been expected, the organ was not in an advanced state of red atrophy. The central veins of the lobules did not appear so distended as the secondary and tertiary branches of the hepatic veins.

In obliteration of the inferior cava the collateral circulation is usually carried on by the vena azygos, by means of its extensive communications with the lumbar and renal veins, being sometimes assisted by the superficial and deep veins of the abdomen and the anastomoses of the hæmorrhoidal plexus with the hypogastric and inferior mesenteric veins. In the present instance, also, this vein has been the main channel for the conveyance of the venous blood of the lower part of the body to the heart, and has, in addition, provided accommodation for a considerable proportion of the blood of the portal system. This is one of the most interesting features of the case. It certainly might have been expected, with so serious an obstacle to the flow of the portal blood as was offered by the stenosed orifices of the hepatic veins, that the superficial veins of the abdomen and thorax would have attained a maximum degree of distension. In Baillie's case, no mention is made of the state of the portal circulation; in that of Reynaud's the right branch of the hepatic vein was plugged. Veins of abdominal walls very large. In the clinical report the superficial cutaneous veins are stated to have been enlarged, but I learn from Dr Howard that at the time of his visit the enlargement was by no means remarkable, and this agrees with the condition found *post-mortem*. Nor were the deep abdominal and thoracic veins very much increased in size; and we must, therefore, suppose that the circulation has been carried on chiefly by the azygos. Part of the blood from the lower extremities and pelvis, entering the inferior cava and the large vein lying parallel to it, would find its way through the lumbar, the remainder, with that from the kidneys, would pass to the azygos through the communicating branches with the renals, and chiefly through the large vessel arising from the upper and

back part of the left renal, which, although its course was not traced, from its position and direction, must be regarded as a feeder of the azygos. The vertebral and dorsal cutaneous veins may have participated in carrying on the circulation.

It is not easy to determine the nature of the large vessel which passes from the iliacs on the left side along the aorta to the renal. The situation corresponds to the left spermatic, which has in several cases been found excessively dilated, and no other vein corresponding with the spermatic was found on this side. But why the free communication with the iliacs? The spermatic may have originally sent small branches to the iliac, which have subsequently dilated to such an extent as to appear as the direct continuation of the vessel. It was suggested, as some lumbar branches open into it, that it might be the azygos minor, which Henle¹ figures as connected with the common iliac; but, if so, why should it empty into the left renal? The situation and connections correspond exactly with a small vein, mentioned by Hallett² in his interesting paper, "which passes and establishes a communication between the common iliac vein and renal vein," and which, though not always present, may be considered normal. In the case of obliterated vena cava which he reports, it was enlarged and joined the ovarian vein.

From the absence of symptoms of obstruction in the portal system up to a short time before the fatal illness, we must conclude that a collateral circulation of sufficient activity had been established to compensate for the greatly narrowed streams from the hepatic veins. So far as was ascertained, this had taken place through the diaphragmatic and œsophageal plexuses, both of which were greatly distended. The veins of the falciform and round ligaments were moderately enlarged. It is not probable that any assistance was afforded to the portal system by the hæmorrhoidal veins through their connections with the inferior mesenteric.

The clinical history of this case, though in many respects incomplete, is very remarkable. In the first place, it must be admitted that the obliteration had lasted for some time, and did not occur during the last illness. The cord-like condition of the

¹ *Anatomic des Menschen, Gefäßlehre*, p. 336.

² *Loc. cit.*

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obliterated part, the degeneration of the vein in the neighbourhood, the enlargement of the collateral branches, and the fact that for five or six years his legs were slightly swollen, point to an obstruction of long duration. Cases of occlusion are reported¹ in which life has been prolonged and tolerable health enjoyed for many years, an active collateral circulation obviating the effects of the obstruction; and among such this case may be reckoned. A difficulty here arises with respect to the hepatic veins. Are we to suppose that the narrowing to which their orifices have been subjected is of the same date as the closure of the inferior cava? or have the contracting fibrous cord and subsequent changes induced the degree of stenosis met with at the autopsy? To suppose that the extreme narrowing of these veins is of quite recent date would harmonise well with the clinical history and explain the rapid ascites, but the cirrhotic state of the liver, and the evidence of chronic congestion in the portal system, as well as the absence of recent changes about the hepatic veins, suggest an opposite conclusion.

It is not easy to give a rational explanation of the sudden development of the ascites. From the 12th to the 23d of December the patient suffered from symptoms of gastric and intestinal catarrh, and it was only on the latter date that swelling of the abdomen was detected. From this time until his death on 15th of January, the ascites became the prominent symptom, twice necessitating tapping the abdomen, each time with the removal of a large quantity of fluid. There was nothing in the condition of the portal and hepatic vessels to indicate any recent change which would explain the rapid accumulation of fluid, so that we must seek for the cause either in the blood or the state of the vascular walls. It may be that the attack of diarrhoea, which lasted from the 12th to the 20th, induced a depraved condition of the blood, or acted upon the portal vessels in such a way as to bring about that increased permeability of the walls, which, according to Cohnheim,² is the prime factor in dropsy.

However that may be, a parallel example is presented by certain cases of cirrhosis of the liver, in which a dropsical con-

¹ Robin, *Loc. cit.*

² Virchow's *Archiv.* Bd. 69. *Allgemeine Pathologie*, p. 375.

dition may develop with remarkable rapidity, and even without the common premonitory symptoms of gastric and intestinal catarrh. Such a case has recently been under the care of my colleague, Dr Ross, in the General hospital: the patient, a hard drinker, continued at work, and perfectly well (according to his own account, and after most careful questioning), up to December 23d. From this date dropsy of the legs and belly came on rapidly. On January 24, hæmatemesis set in, from which he died on the 27th. The liver presented an extreme degree of cirrhotic contraction.

The absence of albumen in the urine is a point worthy of note, and may, perhaps, be taken as evidence that the renal circulation was not additionally embarrassed during the illness. Reynaud,¹ to whose elaborate article I am much indebted, is the only author who dwells upon this symptom, stating that it might be useful as a diagnostic sign of the situation of an occlusion, whether above or below the renals.

And lastly, an interesting clinical feature of the case is the murmur described by Dr Howard. There was nothing found in the condition of the heart to account for it. Of possible sources the following suggest themselves:—(1) The vena azygos, though I am not aware of a murmur ever having been described in connection with this vessel; (2) The thoracic portion of the inferior vena cava, which formed a sort of appendage from the auricle, and into which the blood might be forcibly driven during the auricular systole, being unopposed by any powerful upstream in the cava.

EXPLANATION OF PLATE.

(View from behind.)

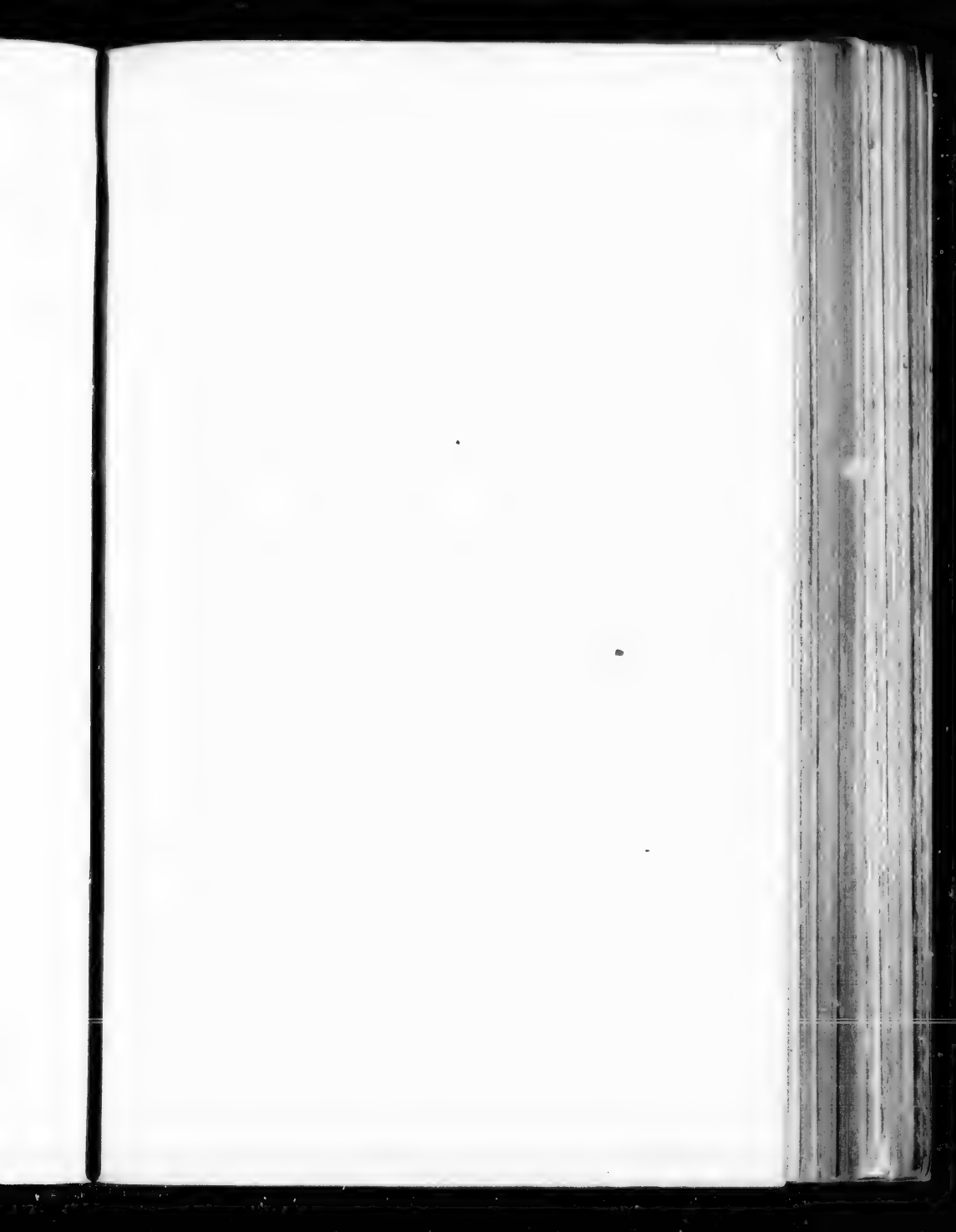
a, Obliterated inf. cava; b, orifices of hepatic veins; c, left renal; d, large branch which opens into it at the upper and back part; e, supplementary vein lying parallel to inferior vena cava; f, right spermatic (represented by the artist as too far posteriorly); g, orifices of lumbar branches of inf. cava, and supplementary vein.

¹ *Nouveau Dictionnaire de Médecine et de Chirurgie*, art. "Caves."



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CASE OF CONGENITAL AND PROGRESSIVE HYPERTROPHY OF THE RIGHT UPPER EXTREMITY. By
 WILLIAM OSLER, M.D., M.R.C.P., *Professor of the Institutes
 of Medicine in McGill University, Montreal.*

HYPERTROPHY of one extremity or of one side of the body must be ranked among the very rare abnormalities of development. Trelat and Monod in their memoir,¹ published in 1869, were only able to collect twelve cases, apart from instances of hypertrophied fingers and toes, which are much more common. Since that date the only other case to which I can find reference is one reported by Ewald in Virchow's *Archiv* (1872), in which the left hand was affected. Of the cases summarised by Trelat and Monod, in one it was confined to the right upper extremity, in six both upper and lower limbs of one side were affected (4 on the right, 2 on the left side), and in all the leg much more than the arm; in two the leg alone was involved; in one the right side of face, and in one the right side of head and face. With the exception of a case of Mr Adam's (*Lancet*, 1858) all of these are reported by continental writers.

I am indebted to my colleague Dr Drake for the opportunity of examining the following case, and for permission to publish the notes.

A. B., aged 8 years and 10 months, a well grown, healthy-looking girl, the eldest of a family of four; parents healthy. The mother states that while pregnant her brother met with an accident by which his hand was severely crushed, necessitating the amputation of several fingers. She did not see him until six weeks before her confinement, when the hand had healed, but the appearance of it gave her a great shock, and, of course, she attributes the deformity to this cause. Dr F. W. Campbell, the family physician at the time, informs me that the enlargement of the arm was quite noticeable at birth; but his attention was chiefly directed to the hand, which was deformed, with the fingers strongly flexed, and attempts were made to remedy this condition by the use of a straight splint. Not long after the case came

¹ *Archives G n rales de M decine*, 1869.

into Dr Drake's hands, and has been under his observation ever since, and he bears testimony to the gradual and progressive growth of the limb with the development of the child. The mother thinks that the arm is larger in proportion, and more noticeable now than in infancy.

The present condition is as follows:—

When stripped the child presents a remarkable appearance from an abnormal development of the right upper extremity, which, in contrast to the limb on the left side, looks like that of a medium-sized man. The enlargement extends to the muscles of the shoulder. Sides of face and abdomen symmetrical, legs of equal length and size. Chest is well formed, expansion good, equal on both sides; right half measures 4 centimetres more than the left. Right pectoralis major is hypertrophied, and stands out very prominently when contracted. Right shoulder is considerably larger than the left, and when she stands straight is on a higher level. The deltoid is greatly developed, the trapezius less so. Scapulae equal in size; no marked difference in their muscles. Right clavicle is a little longer than the left (6 mm.), sternocleidomastoid muscles of equal size.

The following are the comparative measurements:—

Chest, just below nipple, circumference, 56 centimetres.

Chest, right half, 30 centimetres; left half, 26; difference, 4.

Upper extremity from tip of acromion to styloid process of radius, right, 42 centimetres; left, 37; difference, 5.

Clavicle, length, right, 11·5 centimetres; left, 10·9; difference, ·6.

Humerus, length, right, 24·1 centimetres; left, 21; difference 3·1.

Arm, circumference, biceps extended, right, 18·5 centimetres; left, 15·6; difference, 2·9.

Arm, circumference, biceps strongly flexed, right, 20·3 centimetres; left, 15·9; difference, 4·4.

Humerus, width across condyles measured with pair of compasses, right, 7 centimetres; left, 6; difference 1.

Fore-arm, circumference, thickest part, right, 21·2 centimetres; left, 17; difference, 4·2.

Wrist, circumference, right, 15·5 centimetres; left, 12; difference, 3·5.

Hand, circumference, right, 20·3 centimetres; left, 15·7; difference, 4·6.

Hand, across metacarpal joints, right, 9·5 centimetres; left, 7; difference, 2·5.

Middle metacarpal bone, length, right, 5 centimetres; left, 6.

Middle finger, length, right, 8 centimetres; left, 8·5.

Index finger, length, right, 7·7 centimetres; left, 7; difference, ·7.

Thumb, first joint, circumference, right, 9; left, 6·5; difference, 2·5.

The muscles of the humerus are strongly developed, the biceps particularly so, and it stands out in bold relief when flexed, feeling also much firmer than the corresponding muscle of the other side. The fore-arm presents a very substantial muscular appearance, and affords a striking contrast to the child-like aspect of the other arm. The wrist is thick and solid; the hand square and thick, short in proportion to its size, with large and prominent knuckles. The palmar surface presents a thick pad of fat, over which the skin is loose and more creased than usual. The ball of the thumb is large, and all the muscles are strongly developed. The fingers are small in proportion, and are kept in the semi-flexed position, which gives a somewhat deformed appearance to the hand. With the exception of the middle finger, they can all be fully extended, and it has a moderately free range of motion. When born the fingers were much more flexed, and the power over them has only been gradually acquired by use. The position of semi-flexion does not trouble her in the least, as she can at will extend the fingers sufficiently for all practical purposes. Skin on the limb is normal. Temperature on both sides equal. Sensibility perfect. No perceptible difference between the brachial pulses. Beat of the left radial is if anything more distinct than that of the right. Arteries are not apparently enlarged. Muscular power of hypertrophied limb is greatly increased. It could not be accurately measured with the dynamometer, as the instrument could not be properly grasped in the hand, but the difference was most marked on comparing the grip of the two hands, that of the right being very firm and powerful compared with the left. She is naturally right-handed, and uses the limb for sewing, writing, and all ordinary duties.

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TWO CASES OF STRIATED MYO-SARCOMA OF THE KIDNEY. By WILLIAM OSLER, M.D., M.R.C.P.L., *Professor of the Institutes of Medicine, McGill University, Montreal.*

TUMOURS containing striped muscle fibres (*Myoma strio-cellulare* of Virchow; *Rhabdomyoma* of Zenker) are oncological curiosities. Between twenty and thirty cases are on record, the majority of which have been found in connection with the testicles or ovaries. Eberth¹ first described a tumour of this nature in the kidney in 1872, Cohnheim² a second in 1876, since which date four other cases have been recorded by Marchand,³ Landsberger,⁴ Kocher and Langhans,⁵ and Huber.⁶

All the cases occurred in children from 7 to 39 months old. The tumours were large, the weights ranging from 587 to 5500 grammes. In one instance both organs were affected. In two there were secondary masses in the liver, in one of which muscle fibres were found. All of the tumours correspond very closely in histological characters, being composed of a sarcomatous basis of round cells, traversed by bands of firmer, fleshy tissue, in which the muscle fibres occurred.

The following cases have come under my observation in the past two years:—

CASE I.—*Striated Myo-Sarcoma of left kidney. Death with gastro-intestinal symptoms.*

George H., aged 19 months, patient of Dr Dugdale. Had been a healthy child. On March 23d, 1878, he was vaccinated in the morning, after which he appeared in his usual health. At two o'clock P.M., he began to vomit and have severe gastro-intestinal symptoms. They yielded to treatment, but the child sank and died at two o'clock the same evening. At the autopsy on the following day nothing unusual was found except a tumour

¹ *Virchow's Archiv*, Bd. lv.

² *Ibid*, Bd. lxx.

³ *Ibid*, Bd. lxxiii.

⁴ *Berliner Klin. Wochenschrift*, 1877.

⁵ *Deutsche Zeitschr. f. Chir.*, Bd. ix.

⁶ Huber, *Deutsches Archiv. f. Klin. Medicin*, Bd. xxiii. 1878.

of the left kidney, which was removed and sent to me for examination.

Organ is enlarged and has the shape of a blunt pyramid, the convex border projecting, the inner surface, with the hilus, presenting a tolerably straight line, extreme length over outer border, from one end to the other, 16 centimetres. The capsule is thin, detaches easily, and a large white mass can be seen through the thin layer of cortex on the convex border. On section, the central part of the organ is occupied by a tumour measuring about 7 centimetres in each direction, broadest at the pelvis with which it is in contact, and gradually narrowing towards the outer border, where it is separated from the capsule by a layer of kidney substance 2 to 3 m. in thickness. At the upper and lower ends of the organ the cortex and cones are still to be seen though somewhat diminished in volume. In its growth the tumour has expanded the renal substance in such a way that a progressively diminishing layer covers it from the ends towards the centre. The mass is not encapsulated, but at the margins can be seen penetrating the kidney tissue, strands of which separate the advancing portions. The cut surface of the tumour is greyish-white, and has a porous spongy appearance, from the presence of small irregular spaces. Bands of translucent-looking tissue pass in all directions, crossing each other and dividing the substance into areas which are occupied by a soft granular substance. Some of the strands passing from the deeper parts are 2 m. in thickness. The pelvis and calyces are somewhat compressed; the ureter opens directly below the centre of the mass, artery and vein normal.

CASE II.—*Striated Myo-Sarcoma of left kidney. Sudden death from blocking of pulmonary artery and tricuspid orifice with sarcomatous thrombi dislodged from renal vein.*

C. S., female child, aged $3\frac{1}{4}$ years, patient of Dr Finnie's. Had been ailing for about six weeks with gastric and intestinal symptoms, occasional vomiting, and obstinate constipation. Slight pain in abdomen, and on inspection a tumour was discovered in left hypochondriac region, just below the cartilage of the 8th rib. It was soft and apparently fluctuated. Child had not been confined to bed. On getting up one morning and

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walking towards her mother's bed, she was suddenly seized with a "choking fit," and died in a few moments.

Autopsy.—Body well nourished. On opening abdomen a tumour is seen on the left side, covered by peritoneum and descending colon and occupying the position of the left kidney. Spleen is pushed up, and the end of the tumour projects beneath the costal border in the axillary line; this superficial portion is quite soft, and apparently fluctuates. Tumour had no attachments, and peeled out readily; numerous veins course over it in front. It is ovoid in shape, large and rounded below, pointed above where it is capped by the adrenal. Anterior and upper surfaces dark and hæmorrhagic-looking; on the under surface there is natural-looking kidney substance for 2-3 centimetres about the hilus. *Renal artery* natural. *Renal vein* of large size, and when slit open, soft pulpy matter is seen oozing from the organ into it. The wall is rough, irregular, and covered with bits of soft greyish tissue. *Ureter* is pervious, not dilated; pelvis small; calyces at each end compressed. On section through the long axis of the tumour it presents the appearance of a soft rapidly-growing neoplasm. Above and in front, the tissue just within the capsule is deeply infiltrated with blood, and in places occupied by clots; the greater part of the exposed surface is made up of greyish-white, soft, cerebriiform material. At the upper part two pyramids of kidney substance are surrounded by the new growth; the remnants of the organ at the under and lower surfaces are not seen on this section. Tumour measures 15 centimetres in length by 7.5 in breadth, and is about the size of a cocoa-nut.

Heart of normal size; right auricle contains much blood. Lodged in the auriculo-ventricular orifice is a firm greyish-white mass, 25 m. long 12 m. broad, not adherent, and without any fibrinous flakes upon it. Right ventricle contains dark clotted blood; in orifice of pulmonary artery there is another firm greyish-white mass about the size of a hazel nut, and beyond it in the right branch are two or three smaller bits of the same character.

Lungs somewhat congested at bases; no secondary masses.

Histological examination.—Case I. Tumour is made up of a soft greyish-white substance enclosed in irregular spaces formed

by bands of firmer tissue which pass in various directions through the mass. The former is composed of round cells about the size of colourless blood corpuscles; protoplasm finely granular, and with a single large nucleus. Some of the cells are a little irregular in outline, and in teased bits from the peripheral portions renal epithelium is occasionally seen. A scraping from the tumour or bits picked out from the interspaces consist entirely of the round cells, and the same are seen in sections closely packed together without any apparent intercellular substance.

The strands of firmer tissue consist of (1.) elongated spindle cells, the majority of which have prolonged extremities; others are flatter without the long processes and bear a strong resemblance to unstriated muscle fibres. They are either closely arranged together or are separated by a delicate wavy fibrillar tissue, which in places makes up the chief part of the bands. The cells possess a single elongated nucleus. They are from 0.0625—0.1 m. in length. (2.) Striped muscle fibres, occurring in variable numbers among the spindle cells and fibrous tissue of the septa, usually in bundles of 20 to 40; more rarely isolated fibres are met with. They do not often cross each other but keep parallel. When isolated they form flattened band-like fibres, ranging from 0.0625—0.375 m. in length, and from 0.0075—0.01 m. in breadth. The majority of them are not more than 0.0075 m. broad, while some of the less perfect fibres are narrower, 0.003—0.004 m. Most of the fibres have the same diameter throughout, others are larger at the centre and taper towards the ends, which are either square-cut or obtuse, less frequently pointed. The prominent feature is the distinct transverse striation, the substance of each fibre presenting cross lines, which are seen to be due to alternate light and dark areas in the tissue, the latter being the broadest. In large well formed fibres the striation is as distinct as in ordinary muscle; indeed, I have rarely seen in any specimen the "sarcous elements" so well marked. The majority of the fibres are nucleated; in some long ones three or four nuclei are arranged one after the other, and are connected together by a granular protoplasm. Scarcely any of the cells are striated in all parts; the nucleus and a central extension remain free, and the stria-

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tion is confined to the outer borders. In wide fibres a longitudinal striation can be seen, but a separation into distinct fibrillae was not met with. The nucleus is central, usually oval in shape, and a nucleolus is sometimes visible. So far as could be ascertained the fibres do not possess sarcolemma. Many cells were partially striated; sometimes a long band-like fibre had two nuclei; one end was distinctly striped, the other had the appearance of a smooth muscle fibre. Sometimes a fibre cell was seen with a small part of the protoplasm striated. A peculiar form of cell was club-shaped with a large nucleus and very plain striae; others of the same shape were not striated, or had very faint transverse bars near the nucleus. In some places groups of flattened non-striated fibres were met with, which resembled closely involuntary muscle fibres. These appear to be intermediate forms between the fusiform cells, the smooth band-like fibres, and the fully-developed striated ones.

Case II. Tumour is made up of soft greyish substance, which consists chiefly of round cells a little larger than colourless blood corpuscles, and with single large nuclei. They are closely packed together with very little intervening tissue, and do not present an alveolar arrangement. Bundles of fusiform cells and connective tissue fibres pass through the structure in various directions, but do not form such definite bands as in the previous specimen. The fibre cells are elongated and have large oval nuclei. Some form flattened bands like smooth muscle fibres. Scattered among these elements in variable numbers are striated muscle fibres resembling those described in Case I. They are not, however, nearly so abundant, but in almost every specimen taken some examples were met with. In the mass which had lodged in the right auriculo-ventricular orifice they were very plentiful. They present similar characters to those above described; flattened, nucleated cells, with transverse striation. In some the striae are scarcely visible, in others only part of the protoplasm is striated. In this specimen the fibres did not form such large bundles, nor were they so long.

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CASES OF CARDIAC ABNORMALITIES.

ON THE CONDITION OF
FUSION OF TWO SEGMENTS OF THE SEMI-
LUNAR VALVES

BY

WILLIAM OSLER, M.D., M.R.C.P., LOND.

Professor of the Institutes of Medicine, McGill University.
Physician to the Hospital.

(From the Montreal General Hospital Reports, Vol. I., 1880.)

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CASES OF CARDIAC ABNORMALITIES

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CASE I.—*General Dropsy of the Fetus—Dropsy of the Placenta—Premature Closure of Foramen Ovale—Compensatory Enlargement of Ductus Arteriosus.* (Plate.)

The following clinical notes of the case have been kindly furnished by Dr. Ross :—

"Mrs. X. was expecting to be confined for the second time in March, 1879. Her first child, born in 1878, is strong and healthy. No trouble with the accouchement, but the mother suffered severely from subsequent metritis. During the second pregnancy she was always timid and nervous. Quickening took place at the usual period, but she thought the movements never felt as strong as with the other child. In the latter months she complained of a feeling of great weight, and sometimes coldness, in the abdomen, and movements ceased. No fœtal heart sounds could then be heard. After the seventh month she increased very rapidly in size, until the abdomen at last was as large as that of a woman carrying twins. The day before she was confined she had a violent rigor, accompanied by intense lumbar pains and vomiting; soon followed by high fever and very rapid pulse. This state of things con-

tinued during the whole of the next day, and delivery took place with the patient's temperature at 103° F., and pulse at 140. The labour was of about four or five hours' duration. The quantity of liquor amnii was very great. At the first vaginal examination, when the os was not fully dilated and the head was high, it was thought that the breech was presenting, but as the part descended the head was clearly recognized by the hairs which could be felt, but no suture could be made out, the scalp feeling thick and indenting somewhat with the finger. When born, it was at once seen that the peculiarities observed were due to general œdema of the fœtus. The cord was much swollen and œdematous. The placenta followed in a few minutes. It was very large, soft, and of great weight; unfortunately, it was not preserved for subsequent examination. I might further state that Mrs. X. went through a severe attack of troublesome septicæmia, affecting several joints in a very painful manner, but fortunately none of them suppurated. She made ultimately a good recovery, and at the present moment is once more in the family way—and, it is to be hoped, will have 'better luck this time.'

Autopsy.—Male infant, 43 cm. long; girth of abdomen, 33 cm.; of thorax, 33 cm.; of head, 34 cm. Whole body much swollen and in a condition of extreme anasarca. Skin glistening and tense, reddish in colour. At the examination, 15 hours after birth, rigor mortis present; limbs were quite lax when the child was sent to me immediately after delivery.

Head much enlarged and disfigured; fontanelles and sutures only felt on deep pressure, after which the skin remains pitted. Eyes closed, eyelids much puffed; nose scarcely to be seen on profile, owing to swelling of cheeks. A clear fluid oozes from the nostrils; upper lip large, lower one natural. Ears œdematous and project but little. Neck enlarged; thorax of good shape; belly not very pro-

tuberant. Attached portion of cord large; 2.5 cm. from the belly wall measures 7 cm. in circumference; vessels in it distended. Penis and scrotum swollen and tense. Legs and feet greatly swollen, the skin of the latter glistening and tight. Arms and hands in a similar state of extreme œdema.

On making the preliminary incision, a layer of œdematous tissue is cut through 1.5 cm. in thickness in thorax, rather less on abdomen, and a quantity of clear serum follows the section. The panniculus adiposus is infiltrated and presents a very peculiar appearance, the isolated lobules of fat, opaque white in colour, being scattered through a translucent, gelatinous-looking tissue.

On opening the peritoneum, a considerable quantity of fluid escaped—about two pints. Position of viscera normal. Intestines pale and shrivelled. Umbilical vein large and distended with blood.

In thorax, about two ounces of clear serum in each pleura.

Heart enlarged; circumference at base 7.5 cm., of which 5 cm. are formed by right ventricle. Length of right ventricle, from auriculo-ventricular groove to apex, 4.2 cm.

Right Auricle much distended; when slit open from tip of appendix to point midway between the orifices of the cave, it readily admits a ball 6.8 cm. in circumference. Chamber contains fluid blood and one small clot. Musculi pectinati extend over the whole internal surface, with the exception of the septum and the part between the orifices of the veins. Wall measures 1.5 m. in thickness.

Eustachian valve large and well formed; its inner attachment extends as a prominent ridge along the lower and anterior wall of the annulus ovalis. From this chamber the foramen ovale is seen to be occupied by a thin membrane which apparently closes it completely. The fossa and annulus are well marked on the posterior

margin of the latter is a dark spot 2·5 m. in length, which on section proves to be a spot of apoplexy. On carefully running a probe round the margin of the fossa, it is found to pass through a valvular opening at the upper and back part. When examined from the left auricle, the membrane closing the orifice is seen to overlap the margin at the upper and back part to an extent of from 3 to 4 m. At this part it is not attached to the annulus, so that a valvular orifice is left which measures 8 m. in length and is capable of being lifted up to such an extent as to measure 5 m. in the transverse direction. The portion of auricular septum formed by this membrane, and corresponding to the foramen ovale, measures 8 by 10 m. The membrane itself is thin and translucent, crossed by numerous fine trabeculae. The supplementary portion appears thicker than the rest, and the free edge is rounded. The orifice of the superior cava measures 1·7 cm. in circumference, that of the inferior 2·7 cm.

Right Ventricle dilated and hypertrophied. Chamber measures, from pulmonary ring to apex, 3·3 cm. Columnae carneae prominent and large. Walls thick, especially at the base, where there are very thick muscular bundles—here it is 8 m.; towards apex thinner, 2 to 4 m. Tricuspid valves normal, orifice 3·2 cm. in circumference. Conus natural.

Pulmonary artery, springing from the venticle, is large, and appears to pass as a considerable trunk directly into the upper part of the descending aorta, which looks, in fact, like a continuation of it. This appearance is due to an enormously enlarged ductus arteriosus, which almost equals the aorta in size:—External circumference of aorta, ascending portion, 1·7 cm.; of ductus arteriosus, 1·6 cm. Length, 2·2 cm. It enlarges slightly on entering the aorta, and immediately above this the vessel is somewhat constricted, measuring only 1·3 cm. in circumference.

Left Auricle small, compared with the right. No hyper-

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trophy. Nothing of note, further than what is stated above with reference to the foramen ovale.

Left Ventricle also small in comparison with the right chamber; measures from aortic ring to apex 2·2 cm. Valves healthy. Mitral orifice 2·5 cm. in circumference. Muscle substance of whole heart of good colour, and fibres healthy.

On visceral layer of pericardium are numerous small ecchymoses.

On slitting up the anterior part of the neck to get out the trachea, a large extravasation of blood is exposed beneath the skin in this situation, chiefly in the form of dark, fresh-looking clots, extending from the clavicles and sternum to the lower jaw. A careful dissection was made of the veins and arteries, but no rupture was found.

Lungs small, pale-red in colour, airless, occupying small space in the pleuræ, being compressed by the fluid. Ecchymoses on both layers of pleura.

Spleen large, of a reddish-purple colour. Measures 9 cm. in length by 4 cm. in width. Surface rough and granular. On section, firm, uniform.

Kidneys and *suprarenals* healthy and of normal size. Only a trace of fluid in the *bladder*.

Liver is large, extending far into the left hypochondriac region, measuring 16·5 cm across, 7 cm. in antero-posterior direction. On section, healthy-looking, but congested, and on examination with hand-lens the territories of the small hepatic—intra-lobular—veins are seen to be chiefly injected.

Stomach contains a tenacious dark material. Small intestines, filled in upper part with greyish mucus, below with meconium. Large bowel distended with same material.

Testicles.—Left at the internal ring; right almost in scrotum.

Umbilical arteries look large.

Umbilical vein admits a probe 1·6 cm. in circumference. Ductus venosus much dilated, forming a large sinus 2 cm. across at the under surface of the liver; from the posterior part of this the ductus passes off as a tube 1·2 cm. in diameter.

Remarks—The condition of general dropsy of the fœtus does not appear to have received much attention at the hands of obstetric physicians. Very few cases are now on record; none appear in Pathological Society's Transactions; only three in the Obstetrical Society's; none have been reported in the *Archiv für Gynæcologie*. Mr. Clay, of Manchester, has reported two cases.¹ Three other instances have been mentioned to me by practitioners in this city—one by Dr. McCallum, a second by Dr. Ross, and a third, quite recently, by Dr. Rodger. All were accompanied with dropsy of the placenta.

The points of interest in connection with this case are the premature closure of the foramen ovale, the condition of general anasarca of fœtus and placenta, and the probable causal connection between these conditions. Closure of the foramen ovale to the extent met with in this case is certainly an abnormal condition in the fœtus. No doubt, a small amount of blood found its way through the narrow slit of communication, but that this was trifling in quantity is shown by the dilatation and hypertrophy of the right chambers of the heart and the compensating enlargement of the ductus arteriosus. These conditions can be explained in no other way than on the view that the foramen had been virtually closed for some time, and, in consequence, the blood from both cavæ had to follow the course of the adult circulation, necessarily increasing the work of the right heart, and gradually leading to enlargement of the ductus arteriosus.

¹ Reprint from "*Zeitschrift der Kaiserl. Königl. Gesellschaft der Aerzten zu Wien*," 1860. I am much indebted to Mr. Clay for kindly sending me a copy of his communication.

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Premature closure of the foramen ovale has not often been noted. Dr. Peacock¹ was only able to collect three cases, and since that date I have found but one other, reported by Mr. Lawson Tait,² and in it the fœtus and placenta were dropsical.

The dropsy of placenta, amnion, and fœtus had doubtless resulted from a common cause. Was this the premature closure of the foramen ovale? We can suppose that obstruction in the central organ would be quickly felt in the distant placental vessels—just as in the adult it is first manifested in the vessels of the feet—and a condition of passive œdema be brought about. The hydramnion could be explained in the same way. The general anasarca of the fœtus resembles a renal rather than a cardiac dropsy, which in the adult is never so extensive. In the discussion on a case of Dropsy of the Fœtus in the Obstetrical Society, Dec. 5, 1877, Dr. John Williams, of University College, suggested an ingenious explanation of the fœtal dropsy, as follows:—"As the kidneys appear to be almost inactive at this time, it is not unreasonable to suppose that the placenta acts also as a renal organ, separating excrementitious matters from the fœtal circulation. If this be true, œdema or thickening of the placental tissues would interfere with this excretory action and give rise to the accumulation of excrementitious material in the fœtal blood, and give to that fluid characters similar to those found in Bright's Disease, with general anasarca as a consequence." The same line of argument is ably followed in two editorials in the *Lancet*, Feb. 5th, April 25th, 1876, and the explanation certainly fits those cases in which the foramen ovale has been found prematurely closed.

True, we might suppose, as suggested by Dr. Williams,

¹ On Malformations of the Human Heart. 2nd Ed., 1866.

² Obstetrical Society's Transactions, 1875.

a primary disease of the placenta by which the blood current in the umbilical vein would be so much diminished in force that on reaching the right auricle the velocity became greatly reduced, so that "overcome by the force of the stream from the superior cava it flowed into the right ventricle." This could hardly happen, for the admixture of the two currents is very slight, and moreover in our case it would not account for the great hypertrophy of the right heart.

Of the other cases recorded, the foramen ovale was found open in Dr. Bassett's;¹ in Dr. Protheroe Smith's² the heart is stated to have been normal, and in one of Mr. Clay's cases the organs are said to have been healthy. No record is made in these cases of the state of the umbilical vessels, a stenosis of which at any part might induce these changes, as in case referred to by Fehling.³

In one of the numbers of the *Centralblatt, f. d., Med. Wissenschaften* of this year, there is a brief abstract of a paper by Kleb's, in which it was stated that he believed dropsy of the fœtus was induced by fœtal leukaemia. Unfortunately, the number containing the abstract has been mislaid. I have no memorandum of the condition of the blood in my notes, but I am almost certain that it was examined for nucleated red blood corpuscles, and if there had been an excess of white it could scarcely have been overlooked. The spleen was certainly much enlarged, and firm; the lymphatic glands were normal.

Whatever may be the cause, the condition of general dropsy of the fœtus is one of very great interest, and it is to be hoped that practitioners who may happen to meet with cases will inspect most carefully the condition of the foramen ovale and the umbilical vessels.

¹ Obstetrical Society's Transactions, 1877.

² Obstetrical Society Transactions, 1875.

³ Archiv. für Gynecologie Band. X.

CASE II.—*Extreme Stenosis of Orifice of Pulmonary Artery—Slight Stenosis of Tricuspid Orifice—Septum Ventriculorum perfect—Great Hypertrophy of Right Ventricle.* (Plate.)

J. C., æt. four months, well-nourished and of average size. Had been noticed from birth to have a somewhat leaden hue, but nothing special was observed, and he throve like any other healthy infant. During a slight attack of bronchitis he became much more cyanotic, and died suddenly after a few days' illness.

Autopsy, ten hours after death:—

Nothing of special note in *abdominal* cavity.

In *Thorax*, heart in pericardium of large size, pushing aside the lungs.

Heart greatly hypertrophied. Circumference at base 13 cm., of which 8 cm. is formed by the right, 5 cm. by the left ventricle. *Right auricle* greatly distended, appearing as large as a small-sized orange. Contained a firm gelatinous clot. From apex of appendix to opposite wall it measured 6 cm. A small billiard ball fits into the chamber. Trabeculae much developed in both sinus and appendix. Foramen ovale almost closed, only a narrow slit remaining. Tricuspid orifice from the auricle looks small, the valves thick and roughened, presenting in spots reddish gelatinous swellings. From this side only two segments are seen, a large anterior and a small posterior one. Length of orifice, 1.4 cm.; diameter, 7 m. From the ventricle, segments appear contracted and thick, the edges red and swollen; a small, colourless, pedunculated vegetation is seen on edge of posterior segment. Chordae tendineae much thickened and shortened; only seven exist; the two near the septum are particularly thick and short. *Right Ventricle*—Length of chamber, 4 cm. Endocardium thick and opaque. At the upper part of septum the cavity projects towards the left ventricle; septum is com-

plete. The columnæ carneæ and musculi papillares are very slightly developed; round and oval pits or depressions are seen over the ventricular surface. The conus arteriosus is contracted, measuring only 1.7 cm. in circumference close to the ring. Great difficulty was experienced in passing a probe through the pulmonary orifice, and on slitting up the artery it is seen that the segments of the valve have coalesced, leaving only a narrow orifice, through which a probe .9 of a millimetre in diameter can pass. The margins of the valves are fibrous, and the edges of the tiny orifice firm. The sinuses of Valsalva are large, appearing dilated. Pulmonary artery a little distance above valve measures 2.5 cm. in circumference. Interior healthy, except at one spot, near ductus arteriosus, which is atheromatous. Orifice of ductus arteriosus small, and tiny bristle can be passed through into the aorta. *Left auricle* presents nothing worthy of note. *Left ventricle* appears much smaller than the right. Length of chamber from aortic ring to apex, 4 cm. Mitral and aortic valves healthy; orifices of normal size. Aorta natural-looking. A small funnel-shaped dilatation exists at orifice of ductus arteriosus.

Measurement of the walls:—*Right Ventricle*—Outer wall at base, behind posterior segment of tricuspid, 1 cm. Anterior wall, middle, 1.3 cm. Close to septum, where excision has extended from base to apex, 2.7 cm. *Left Ventricle*—Anterior wall, near septum, 1 cm.

CASE III.—*Atresia of Pulmonary Orifice—Hypertrophy of Right Ventricle—Imperfection of Septum Ventriculorum—Patent Ductus Arteriosus.* (Plate.)

A. B., male infant, aged 13 days, cyanotic from birth. Body well nourished and of fair development. Skin of face of leaden hue, chest and abdomen darker. Umbilical cord at birth very small. The child suffered from paroxysms of dyspnoea, and died in convulsions.

capillares are pits or depressions. The conus 1 cm. in circumference. It was experimentally found that the segments of the narrow orifice, 1 cm. in diameter, are fibrous, and the valves of Valsalva artery a little larger in circumference. Conus arteriosus, aorta arteriosus, rough into the heart of note. Left ventricle. Length of mitral and aortic size. Aorta arteriosus exists

Right ventricle—Outer circumference of tricuspid, 1 cm. in diameter. Septum, where it is attached, 2.7 cm. Left ventricle.

Hypertrophy of Ventriculorum

Heart from birth. Heart. Skin of heart. Umbilical artery. Suffered from aneurysm.

Nothing special in *abdomen*. In *thorax* heart in pericardium occupies an unusually large area in anterior part of chest.

Heart large, all the chambers dilated and full of dark clots and blood. Length from root of aorta to apex 4 cm., circumference at base 12 cm., of which 7.5 cm. formed by right ventricle.

Right auricle dilated; endocardium natural. Foramen ovale partially closed, an oval aperture remaining, 5 m. long, 3 m. broad; behind this, separated from it by a thick process, is another tiny orifice in the septum. Superior and inferior cavæ large. Auricular surface of tricuspid valves studded with numerous gelatinous vegetations about the size of millet seeds. Tricuspid orifice looks large. *Right ventricle*: Length of chamber 3 cm., circumference 5.5 cm. Tricuspid valves healthy. Conus arteriosus narrowed to a small funnel-shaped tube which ends in a cul-de-sac, corresponding to which, on the exterior of the heart, is attached a narrow, cord-like vessel. Behind and to the left of the tricuspid orifice, occupying a position between the conus and left segment of the tricuspid, is a mass of beaded, gelatinous vegetations, from the apex of which a cord passes to either wall of the ventricle, anchoring it in this position. On inspection these vegetations are seen to spring from a thin membrane which forms the upper part of the ventricular septum; on pushing this back, an orifice is seen in the septum measuring 9 m. in transverse, 7 m. in vertical diameter. The lower border of this opening is formed by the muscular wall of the septum, which is here 5 m. in thickness, the endocardium about it thickened, and upon the free edge are some fresh beads of endocarditis. The upper part of the orifice is bounded by a thin translucent membrane, which extends in a valve-like form into the right ventricle, where by its beaded extremity it is anchored by the afore-mentioned chordæ tendinæ. This imperfection of the septum is

limited to the anterior part, the posterior portion is closed by a thin membrane, and to this the adjacent segment of the tricuspid valve is attached. Walls of right ventricle measure—anterior wall, middle, 9 m., at base 1.2 cm. Muscle substance pale and fatty.

Left auricle about half the size of the right. *Left ventricle* dilated, measures from aortic ring to apex 3.5 cm., circumference 6 cm. Valves healthy. Mitral and aortic orifices about normal size. Muscle substance not so pale as in right ventricle. *Aorta* is large, 2 cm. above valves measures 2.7 cm. in circumference. From under surface of arch a large ductus arteriosus springs, which joins the pulmonary artery at its bifurcation; the vessel is 8 m. in circumference. The *pulmonary artery* after leaving the heart passes as a narrow tube for 7 m., widening gradually until it reaches the point where the ductus arteriosus joins the main branches. In its narrowest part the artery admits a probe 1 m. in diameter. Main divisions of pulmonary artery appear of full size. *Lungs* present scattered patches of collapse. Nothing abnormal in the other organs.

CASE IV.—*Descending Aorta, with Left Subclavian, given off from Right Ventricle—Innominate and Left Carotid Arteries from Left Ventricle—Ventricular Septum Imperfect—Fusion of Segments of Semilunar Valves.*

Specimen was procured from a fœtus at the 8th month, which presented numerous other malformations—enormous umbilical hernia, spina bifida, hydrocephalus, talipes, &c.

Heart somewhat larger than the child's fist. Right auricle of moderate size, contains blood and clots; cavity normal. Eustachian valve large; foramen ovale open, but a thin, translucent membrane can be drawn up from the posterior border of the annulus, and half closes the

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orifice. Tricuspid valves present two bead-like hæmorrhagic nodules. Right ventricle larger than the left, walls 2 to 3 m. in thickness; conus arteriosus normal. From this chamber a large vessel is given off, 8 m. in width at the root, passes over the vessel emerging from the left ventricle, across the left bronchus and then descends as the thoracic aorta. Seven millimetres from its origin it gives off small pulmonary branches to the imperfectly developed lungs, and, just before it reaches the spine, the left subclavian, which passes vertically up to the 1st rib. There is no communication with the vessel arising from the left ventricle.

Left ventricle is smaller than the right, but the walls are thicker—3 to 5 m. Mitral orifice and valves normal. A vessel is given off from this chamber, which passes up upon the trachea for 1·2 cm. and then bifurcates, forming the innominate and left carotid arteries. The vessel is only about half the size of that given off from the right ventricle. The septum between the ventricles is imperfect. There is a small orifice, the size of a goose quill, situated in the upper and back part of the septum; to its upper border the left segment of the tricuspid valve is attached, and can be drawn down so as almost to close it.

Left auricle is small; pulmonary veins normal. Semilunar valves in both vessels are abnormal; in the branch from the left ventricle there are only two; in that from the right, there are only two of full size, and a tiny, imperfect one between them.

Remarks.—Cases ii. and iii. illustrate much more common varieties of cardiac abnormalities. Thus, of 181 cases of malformation of the heart, Peacock¹ found stenosis or atresia of the pulmonary artery in 119.

The point of interest in connection with Case ii. is the extreme degree of stenosis without imperfection of the

¹ On Malformations of the Heart. 2nd Ed., 1866.

ventricular septum or patency of the foramen ovale. In the great proportion of cases in which this lesion is met with, the septum is imperfect and some of the blood can pass freely from the right to the left ventricle. Often, too, the foramen ovale and ductus arteriosus are open. In this instance, the lungs received blood through a pulmonary orifice narrowed to .9 m., the enormously hypertrophied right ventricle compensating, in some degree, for the stenosis; the constant lividity of the child expressed the defective arterialization of the blood. Whereas life may be prolonged for years with stenosis of the pulmonary artery, provided the septum of the ventricle is open, death takes place early if the latter condition does not co-exist. Rokitansky¹ states that three months is the longest period to which he has known life to be prolonged when the stenosis is unaccompanied with imperfection of the septum. In this case the child lived for four months, and was a well-nourished, plump infant.

In Case iii. there was complete obliteration of the pulmonary orifice, with imperfection of the septum ventriculorum, the foramen ovale being almost closed. The lungs received blood from the aorta through an enlarged ductus arteriosus. The child lived only thirteen days. The valvular fold which passed from the upper margin of the orifice in the septum, and was anchored by two chordæ tendineæ, must have materially interfered with the transmission of blood from the right to the left ventricle.

Case iv. is remarkable from the fact that the descending aorta is given off from the pulmonary artery, the vessel of the left ventricle supplying only the innominate and left carotid, there being no connection between the two main trunks. This is a somewhat unusual anomaly. It is as if the part of the aorta between the left carotid and the duc-

1 Die Defecte der Scheidewande des Herzens. Wien, 1875.

tus arteriosus was deficient, the ascending and descending aortæ being separate trunks. We may suppose this abnormality to have been produced by an obliteration and final disappearance of the outer part of the 4th left embryonic arterial trunk, which normally completes the aortic arch. This section of the arch, called by Rokitansky the isthmus aortæ, appears especially liable to errors of development or disease, resulting in a constriction of the tube or obliteration. Many such cases are now on record.

As to the mode of origin of the malformations described in Cases ii. and iii., there are two chief theories, 1st, that they result from inflammatory changes—endocarditis—taking place at an early period; 2nd, that they depend upon errors of development. On the first view, the stenosis or obliteration of the pulmonary orifice is brought about by inflammatory processes, just as narrowing of the orifice occurs in the adult by chronic valvular endocarditis. If the change takes place before the complete separation of the ventricles, the septum is prevented from closing, the blood current being forced to pass through this orifice on account of the impediment at the pulmonary ring. By the supporters of the second theory it is rightly urged, that, as the septum closes about the end of the second month, we would have to suppose an endocarditis limited to the pulmonary valves in an embryo not more than 2.5 cm. (an inch) in length, and whose heart could not be above a few millimetres in size,—a supposition scarcely conceivable. On the developmental view, the obliteration or narrowing of the pulmonary artery depends on an unequal division of the primitive truncus arteriosus out of which this artery and the aorta are formed. The septum trunci grows in such a way as to cut off an exceedingly narrow anterior or pulmonary channel which may subsequently become completely closed. This is the view supported by Rokitansky in his last work, whereas he was formerly an advocate for the

older theory. He believes, however, that the malformed vessel may be the seat of inflammatory changes, which aggravate the mischief. In Case ii. the stenosis looked much as if it had been produced by a fusion of the segments of the semilunar valves, the result of an inflammatory process. The artery itself was not at all narrowed. The tricuspid valves are also affected, the margins having united, and the orifice is, in consequence, somewhat narrowed. There is nothing in these conditions which might not have been caused by a fetal endocarditis occurring during the latter half of intrauterine life. I think that in such a case the position and size of the vessels being normal, and with evidences of endocarditis in the tricuspid valves, it is quite unnecessary to fall back on the supposition of an error in the division of the primitive arterial trunk to account for the stenosis of the pulmonary orifice. It may be otherwise, however, in Case iii., where there is complete obliteration, and I am fully prepared to admit the important part played by deviations from the normal processes of development in producing cardiac abnormalities.

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ON THE CONDITION OF
FUSION OF TWO SEGMENTS OF THE SEMI-
LUNAR VALVES

BY

WILLIAM OSLER, M.D., M.R.C.P., LOND.,

The peculiar condition of blending of two of the curtains of the semi-lunar valves has long attracted the attention of Pathologists. The cases here recorded have come under my notice within the past three years, and they illustrate several points in connection with the probable origin and consequences of this affection.

III

CASE I.—*Fusion of Anterior and Left Posterior Segments—Ulcerative Disease of United Segment—Hypertrophy of Left Ventricle.* (Plate, Fig. 1.)

J. S., æt. 26, a stout, well-built young man, was admitted to the hospital on August 23rd with symptoms of valvular disease of the heart. Had worked as a blacksmith. No history of sudden attack. Has had shortness of breath and palpitation for more than a year. There was a double murmur at the base. Left ventricle hypertrophied. Feet and legs became œdematous, skin of upper part of body slightly jaundiced. Death with ordinary symptoms of chronic valve disease.

Autopsy.—*Heart*: weight, 690 grams. Right auricle dilated and full of dark clots. Right ventricle also dilated; measures 13 cm. from pulmonary ring to apex. Anterior wall 5 m. in thickness. Left auricle large. Mitral orifice admits a ball 14 cm. in circumference. Left ventricle dilated and hypertrophied; length from aortic ring to apex, 14 cm.; anterior wall, central portion, 1·8 cm. in thickness; towards apex, 15 cm. Mitral valves slightly thickened; chordæ tendinæ appear of normal length. Musculi papillares flattened; apices fibroid. Aortic valves incompetent; ring measures 8 cm. in circumference, and is guarded by only two valves, between which there is an irregular interval. (Fig. 1.) The right posterior segment is large, 3·5 cm. along its free border, where it is slightly thickened. The body of the valve, except at one spot, is translucent. Anterior and left posterior segments have merged, forming a single, large, imperfect valve, having a free border 3·5 cm. in length, the end nearest the right posterior segment being loose, only anchored by a cord 1 cm. in length, which is attached to the wall of the artery. On either side of this cord a considerable portion of the valve is wanting, and the edges are fresh-looking and sharp. The united segment is thick, especially at the free border, and it is also a little foreshortened. From the external side the sinuses of Valsalva are distinct but the raphé between the segments only extends to their bases. On the ventricular surface a faintly-marked groove indicates the line of separation. *Aorta* a little atheromatous in ascending part. Nothing of special note in the other organs. No infarctions.

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CASE II.—*Fusion of Anterior and Left Posterior Segments—Hypertrophy and Dilatation of the Heart—Sudden Death from Rupture of an Aneurism of Branch of Left Middle Cerebral Artery.* (Plate, Fig. 2.)

M. B., æt. 20, a small but moderately well-built young man. Death took place suddenly, with symptoms of an apoplectic attack. No history could be obtained from the people with whom he lived of any previous attack or of heart disease.

Autopsy.—*Heart* considerably enlarged. Right chambers full of dark clots. Right ventricle somewhat hypertrophied; posterior wall measures 9 m. in thickness. Valves normal. Tricuspid orifice 10·5 cm. in circumference.

Left Ventricle.—Length from aortic ring to apex, 9 cm. Wall, at posterior part, 2 cm.; at apex, 1·2 cm. in thickness. Muscle substance of a good colour. Mitral valves healthy; circumference of orifice, 9·5 cm. Just above the anterior mitral segment, between it and the aortic ring, there is a spot of fresh endocarditis about half the size of the thumbnail, and covered with small, soft vegetations. Aortic valves incompetent. On slitting up the orifice only two valves are seen, the anterior and left posterior having fused. The right posterior segment presents a normal appearance, retaining its shape, though large in proportion to the other, measuring along its free border 3·3 cm., depth 1·6 cm. The substance and free edge are a little thickened and opaque. On the ventricular surface are three small fresh vegetations, and at the centre there is a small depression leading to a tiny perforation of the valve. The sinus of Valsalva is large. The united segments from the ventricular surface appear as one valve, which is, compared with the other, foreshortened and shrunk. The free border measures 3·2 cm., depth 1·3 cm. From the aortic side two sinuses of Valsalva are seen,

separated by a ridge, which extends to the base of the united segment, and as a small line up the aortic surface. The free border is round and smooth on the ventricular side; on the aortic margin there is a row of reddish, gelatinous-looking vegetations. At one angle there is a small fenestration of the valve. The orifices of the coronary arteries are seen behind the united segments, one at the upper part of each sinus.

Aorta is healthy, wall looks thin. Width, 3 cm.—above the valves, 5.4 cm.

Spleen shows traces of three old infarctions.

Kidneys.—Puckered remains of two infarcts in the left, in the right organ a large wedge-shaped one undergoing fibro-caseous change. The aneurism of the left middle cerebral artery is described in another place.

V

CASE III.—*Fusion of Anterior and Right Posterior Segments.*

F. G., æt. 42, a medium-sized, well-nourished man, blacksmith by trade, a hard drinker, and for several years a consumer of chloral. Death took place suddenly, and details of antecedent circumstances could not be procured.

Autopsy.—*Heart* large; left ventricle dilated and hypertrophied. Mitral valve normal. Circumference of aortic ring 9.6 cm. Two valves only are seen, the anterior and the right posterior segments having fused together, forming one large valve, measuring 4.6 cm. along the border. Normal segment measures 3.6 cm. On the ventricular surface the united segment is a little roughened and thick about the centre. A depression is also seen at the attached margin; a slit-like fossa is seen at one angle, looking like a closed fenestra. Body of the valve thin in the centre, a little thickened at margins. From the aortic side two distinct sinuses of Valsalva are seen behind it, but the median raphé only extend about one-third of the way up the valve, spreading out in this situation into irregular

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fibres. Slight atheroma about orifices of coronary arteries. Arch of aorta normal.

Kidneys large and very full of blood. Other organs normal.



CASE IV.—*Fusion of Anterior and Right Posterior Segments.*
(Plate, Fig. 3.)

A. B., æt. 42, a strong, robust man, patient of Dr. Reddy, who has reported the case in *C. M. & Surg. Journal*, 1877. First complained on June 8th of uneasy sensations about the chest and shortness of breath on exertion. Attributed them to overwork during a short business trip to England. No history of rheumatic fever. Heart slightly enlarged; double murmur, loudest at base. Throughout July, August, and September remained in same condition. In the latter part of October dropsy set in. Rough systolic murmur heard at base, and diffuse diastolic murmur over the entire cardiac region. Hypertrophy of the heart has increased. During November he suffered with all the symptoms of ordinary cardiac dropsy, and died on the 30th.

Autopsy—General anasarca. *Heart* weighs 750 grams., being greatly hypertrophied. Right chambers dilated and full of clots; walls of right ventricle increased in thickness. *Left Ventricle*—Chamber dilated; measures 10 cm. from aortic ring to apex. Walls 2 cm. in thickness. Aortic orifice, 8 cm. in circumference. Valves incompetent, permitting of free regurgitation. Two segments only are present, the anterior and the right posterior having joined together. The single valve, the left posterior, is large, measuring 4 cm. along the straight margin and 1.6 cm. in depth. It is a little thickened and opaque towards the attached border. Its sinus of Valsalva is large. The united segment is considerably smaller than the other and is incomplete, a V-shaped piece being absent at one end.

The straight border passes for 3 cm. and terminates in a rounded angle, which is continuous with the V-shaped defect. The edge of this segment is round and thickened and the whole valve opaque; measurement along middle of surface, 1.3 cm. On the aortic side the segment presents an indistinct frenum about the centre of the attached margin, which also serves to divide the sinus of Valsalva incompletely into two, the one behind the imperfect side of the valve being small, the other of fair size.

The arch of aorta is considerably dilated; intima covered with yellowish masses of atheroma.

Heart muscle pale, and on examination is found to be fatty.

CASE V.—Fusion of Anterior and Right Posterior Segments—Ulcerative Disease and Laceration of Left Posterior Valve—Aneurism of United Segments. (Plate, Fig. 4.)

The notes of this case have unfortunately been mislaid, but the House Surgeon informs me that he had the usual symptoms of severe aortic valve disease.

Xavier T., æt. 45; admitted October 24th.

Autopsy.—Body that of a medium-sized man, of slight muscular development. No anasarca.

Heart large and hypertrophied. Right chambers distended with clots; those of the ventricle partially decolorized. Left ventricle firmly contracted; a small, firm clot is attached to chordæ tendineæ. Chamber is considerably dilated. Walls in anterior part 2 cm. in thickness. Mitral valves a little opaque and thick. Aortic orifice measures 8 cm. in circumference. Valves incompetent; water pours through with great freedom. On slitting open the artery only two valves are seen, the representatives of the anterior and right posterior segments having united, forming one large segment measuring 4.5 cm. along the border. From the aortic surface of this

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valve two small aneurisms arise; one, near the centre, about the size of a small cherry, is filled with blood clot and presents two perforations; the other, near the left posterior segment, is not so large, but passes deeply beneath the endocardium, and also communicates with the ventricle by two small orifices. The free margin of the valve is thickened and rough. From the aortic surface two sinuses are seen, separated by a semi-calcareous raphé, which terminates halfway up the valve in a thick tuberos end, covered with small vegetations. The sinus behind the right posterior part of the united segment is the largest and gives off the aneurisms. The left posterior segment is torn across nearly to the attached margin. When the separated portions are placed together they measure only a little less than the large segment. They are greatly thickened by atheromatous deposit, and flap up and down when the heart is moved. The sinus of this valve is large.

The Aorta is normal. Lungs large, and contain spots of apoplexy.



CASE VI.—*Fusion of Right and Left Posterior Segments.*

George G., æt. 40; a large, somewhat corpulent man. Death from typhoid fever, after five days residence in Hospital. No heart symptoms.

Autopsy.—*Heart* a little enlarged. Right chambers distended with blood. Left ventricle large; walls thicker than normal. On slitting up the aorta the two posterior segments are seen to be united, forming a large segment, 4 cm. along free border, 1.5 cm. in depth. From the ventricular surface it is smooth, a little thickened about the centre and free border; thin and natural looking in the rest of its extent. A slight indication is seen below of the separation between the component parts. From the aortic side the two sinuses of Valsalva are seen separated by a raphé which extends as a ridge along the arterial wall. The

sinus behind the part formed by the right posterior segment is much larger than the other, which has one coronary artery just above it. The intima of the vessel in this sinus is rough and atheromatous. The normal valve measures 3.3 cm. along the free border, and is perfectly natural. Aorta presents scattered patches of atheroma in the arch.

vi

CASE VII.—*Fusion of Two of the Semi-lunar Valves at Aortic and Pulmonary Orifices.*

Fœtus at eighth month. Heart and arteries described in Case iv. of "Cases of Cardiac Abnormalities."

On opening vessel of left chamber only two semilunar valves are seen—a large one, 9 m. in width, towards the right; a smaller one, 8 m., towards the left. Both are thin and natural looking. Behind the larger segment a median raphé passes down on the arterial wall as far as the attachment of the valve, and imperfectly divides the sinus of Valsalva. The right coronary artery is given off 4 m. above the margin of the valve. On slitting up the artery of the right ventricle only two valves are seen, each measuring 10 m. along the free border. They are situated to the right and left, and posteriorly do not meet, a small space of 2 m. intervening, which is occupied by an imperfect valvular fold, the margin of which is below the level of the larger valves.

Remarks.—There can be very little doubt that this condition is congenital, as in *case vii.* Dr. Peacock and others have also found a similar appearance in the fœtus, often in connection with other abnormalities, and cases are reported of its presence at all ages. Whether due to inflammation or some primary malformation of the valves is more difficult to say; I incline to the latter view. In the blended valves of *case vii.*, a fœtus at the eighth month, there was no trace of endocarditis or thickening of the segments,

and many various ag any evidence *case v.*

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and many instances are on record of individuals dying at various ages, in whom the fused segments did not show any evidence of past morbid change, as, for example, in *case v.*

I do not think that any of the cases in this series support the view that the affection may originate either by the tearing down of the angle of attachment, or by the adhesions of two segments as the result of disease. If the condition was brought about in this way, we would expect the fused segments to be, in most cases, very much larger than the single one. In four of the above cases the fused segment measured about the same as the normal one; in *case iii.* it was 1 cm. longer; in *case vi.* 7m.

In only one was there any indication at the attached ventricular margin of a separation of the fused segment, *i.e.*, of the existence of the somewhat triangular space which normally is seen between the bodies of the segments, when viewed from the ventricle. In this case there was a shallow groove, corresponding to the attachment of the raphé on the aortic surface. There was no special thickening of the central part of the united curtain, such as might be expected if formed by the tearing down of the angles of attachment.

It is worth noting that in all the cases there was a distinct raphé dividing the sinus of Valsalva behind the united segment; in some it stops at the base of the valve, in others, passes up its aortic surface for a short distance. This might be supposed to point to an origin of the affection subsequent to the formation of the individual valves, otherwise it is difficult to explain the very constant presence of the raphé.

Our knowledge of the development of the semilunar valve is at present very imperfect. Dr. Peacock supposes that they "may be formed by the folding together of the ventricle and artery at the orifice of the vessel, and the subsequent looping up of the band into separate por-

tions." The malformation here in question would be produced by a failure in this process of "looping up."

However brought about, the condition is a dangerous one from the special liability of the united curtain to disease, and also from the tendency to regurgitation, owing to the imperfect adaptation of the segments. Of the six cases in adults, in five death was caused, directly or indirectly, by the valve affection; in three with symptoms of chronic aortic valve disease; in one sudden death, probably by syncope; and in one by apoplexy—rupture of an intra-cranial aneurism.

1 Transactions of the Pathological Society, 1877.

Baillie. Med. Anal. 2nd Ed. Lond. 1812
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EXPLANATION OF PLATES III AND IV.

PLATE III.

Fig. 1.—Atresia of Pulmonary Artery. With patent Ductus Arteriosus.

P.A. Pulmonary Artery.

D.A. Ductus Arteriosus, Case III. p. 196.

Fig. 2.—Ductus Arteriosus and Arch of Aorta in Case of General Dropsy of Fetus.

A. Aorta.

P.A. Right branch of Pulmonary Artery.

D.A. Ductus Arteriosus, appearing as a direct continuation of the Pulmonary Artery. The aorta is narrowed just above the entrance of the duct. Case I. p. 177.

PLATE IV.

Illustrating Case of Stenosis of Pulmonary Orifice.

Fig. 1.—Shows the Pulmonary Artery laid open, the narrowed orifice, and distended sinuses of Valsalva.

Fig. 2.—Shows the stenosis of tricuspid orifice and the greatly hypertrophied right ventricle. Case II. p. 185.



Fig: 2.

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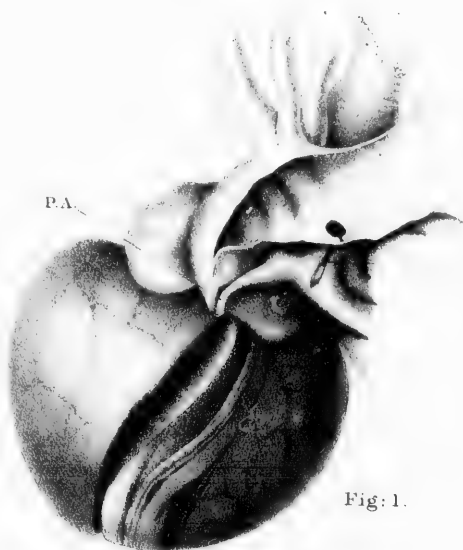


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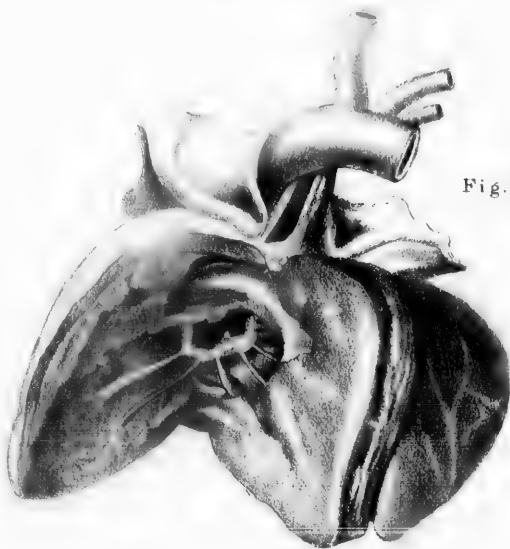
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EXPLANATION OF PLATE IX.

Fig. 1.—Fusion of the anterior and left posterior segments. Ulcerative disease of united curtain. Case I. p. 231.

Fig. 2.—Fusion of anterior and left posterior segments. Case II. p. 235.

Fig. 3.—Fusion of anterior and right posterior segments. V-shaped deficiency in united curtain. Case IV. p. 237.

Fig. 4.—Fusion of anterior and right posterior segments. Aneurisms of united segment. Ulcerative disease and laceration of other valve. Case V. p. 238.



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Fig: 1.



Fig: 4.



Fig. 2.



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THE

PATHOLOGICAL REPORT

OF THE

MONTREAL GENERAL HOSPITAL

No. II.

BY

WILLIAM OSLER, M.D., M.R.C.P., LOND.

Professor of the Institutes of Medicine, McGill University, Physician and
Pathologist to the Hospital.

From the Montreal General Hospital Reports, Vol. I., 1880.

MONTREAL :
THE GAZETTE PRINTING COMPANY.

1880

THE first Pathological Report from the Hospital was issued in 1878. The present comprises a selection from 225 *post-mortems* performed between October 1877 and October 1879. The autopsies are made by the students attending the Hospital under my personal supervision, and the notes are dictated on the spot. During the winter session a "Demonstration Course," in imitation of Virchow's celebrated course at the Berlin Pathological Institute, is held every Saturday morning, at which all the specimens in morbid anatomy collected throughout the week are demonstrated to the senior students. In this way I am enabled to devote more time in the *post-mortem* room to the instruction of the student in the details of the method of performing autopsies,—a very important branch of his education, and one too much neglected in the schools; while at the Saturday morning class, the specimens can be more systematically demonstrated and the material be made more instructive to a larger number of men.

The limited time at my disposal has often compelled me to regard the cases more from the standpoint of the teacher than the scientific investigator.

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PATHOLOGICAL REPORT.

NERVOUS SYSTEM.

1.—*Wound of the Central Part of the 1st and 2nd Frontal Convolution on Left Side.*

H. C., æt. 21, while working a circular wood-saw at 2 p.m., December 3rd, neglected to adjust the bolts, and the saw flew up, striking him on the left shoulder and head. He was unconscious for about ten minutes. When brought to Hospital he was pale and weak, quite conscious, no paralysis. The wound in the skull oozed. Slept well during the night of the 3rd. Passes urine without difficulty. The wound in the shoulder has removed the greater part of the deltoid muscle, the head of the humerus, and the acromion process. The skull wound extends in an oblique direction from above the outer angle of the left orbit across the frontal, through the anterior superior angle of the right parietal, and terminates about the centre of this bone. Length of wound in integument 22 cm., in bone 18 cm. It has penetrated through the membranes, and at the central part the brain substance is lacerated and exposed, and can be seen pulsating.

December 5th, Noon.—Passed a restless night. Has been unconscious since 7 p.m. Incontinence of urine. No paralysis. Pupils are equal. Moves the left arm and leg about in an irregular manner. Muscles of the left side of face twitch occasionally. Moves the right leg, but not the arm of this side. On attempting to separate the lids of the left eye, great resistance is offered.

6th.—Loss of power on right side, but occasionally moves the right foot. There is hyperæsthesia of left side of the face. Still offers resistance to opening of left eye.

7.30 P.M.—Temperature (which has ranged from 100° to 103°), in right axilla 102.6°, in left 106.5°. Complete

immobility of the whole body; no twitching of muscles. Died at 10-15 p.m.

Autopsy.—Wound in skull corresponds with description given above. In dura mater over left frontal region there is a large rent, 7.5 cm. long, 3.5 cm. wide, extending from the longitudinal sinus downwards and outwards to a point a little anterior to beginning of fissure of Sylvius. Blood clots and portions of brain substance fill up the rent. On slitting up the longitudinal sinus, it is found unaffected; where the laceration touches it there is a small mural thrombus. On removing the dura mater, a slight extravasation is seen to extend beneath it. The pia mater is stained, but not much injected. Over the ascending frontal and the parietal convolutions of left side, and over right frontal convolutions, are flakes of lymph, but the meningeal affection is not extensive. The laceration of brain substance is confined to the 1st and 2nd left frontal convolutions, which are completely destroyed in their central portions. The wound extends obliquely, and is from 2 to 3 cm. in breadth, nearly 2 cm. in depth, and involves more of the anterior part of the 2nd than of the 1st convolution. The laceration in the latter stops short a little before the longitudinal fissure. The central part of the 1st frontal convolution on the right side, in an area the size of a small walnut, presents a number of extravasations, about which the tissue is deeply injected. The pia mater over it is inflamed and covered with lymph. Nothing abnormal in central parts or at base.

2.—*Bullet Wound of Right Frontal Lobe—Entire Absence of Cerebral Symptoms.*

C. G., æt. 22, was admitted to Hospital on March 8th, suffering from the effects of a bullet wound, situated above and a little in front of right ear. It was stated to have been caused by the accidental discharge of a pistol.

When seen by Dr. Drake, shortly after the accident, he was perfectly conscious, not paralyzed, and gave a rational account of the whole affair. A probe was inserted into the wound, and it passed freely into the frontal lobe in the direction of the bullet. He was a little dazed, and had ringing in the ears immediately after the accident, but was able to walk about. Had vomiting at intervals for 36 hours after the accident, and during the straining a little blood would ooze from the wound. Pulse 60. No elevation of temperature. Second day after admission complained of frontal pain. Pupils dilated, equal, and responded freely to light. From this time he progressed favourably; only head symptom was an aching pain on right side. After a residence of nearly three weeks in Hospital, symptoms of phthisis manifested themselves, and it was ascertained that he had previously suffered from hæmoptysis, with cough, and occasional night sweats. He left the Hospital on the 27th of April with well-marked disease at apices of lungs, but with complete absence of any cerebral symptoms. The disease of the lungs having steadily progressed, he subsequently entered the Hôtel-Dieu Hospital, and died on the 12th of August. As illustrating the entire absence of all permanent brain disturbance, it may be mentioned that two days before his death he wrote a letter to his mother clear in diction, well composed, and hopeful in character.

Autopsy.—Extensive phthisical disease of both lungs. On reflecting the scalp an oval-shaped opening is observed just above the extremity of the great wing of the sphenoid, involving the edges of squamous and parietal bones. It is almost closed by firm fibrous membrane. On removing skull-cap, dura mater normal on outside. Its inner surface on right side is of deep yellow colour, and this extends to the right surface of the falx, and right half of tentorium. The pia mater in this extent is also stained, but not so deeply. Several fragments of the inner table

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are attached to the dura mater at the site of the wound. The bullet entered the brain substance in the right inferior frontal convolution, just in front of the ascending branch of the Sylvian fissure. From this point the course of the bullet was upwards and forwards, passing out at the inner surface of the frontal lobe and lodging between the brain substance and the falx, where it lay surrounded by a firm membrane. It was situated 6 cm. in front of, and in a line with, the anterior extremity of the corpus callosum. A firm membranous canal marks the course of the bullet, and the brain substance about this is somewhat softened.

DRS. FENWICK AND BELL

CIRCULATORY SYSTEM.

1.—Cases of Aneurism of the Aorta.

Of a number of cases of Aortic Aneurism, the following present points of interest:—

(a.)—Aneurism of Abdominal Aorta—Perforation of Duodenum.

A. B., æt. 60, a patient of Dr. Howard's, had suffered with severe lumbago pains in the back. Only a few days before death he was examined, and an abdominal aneurism discovered. Death took place by hæmorrhage from the stomach and bowels.

Autopsy.—Body that of a well-built, muscular man. Nothing of special note in viscera of chest and abdomen.

Heart of average size; no valvular disease. Arch and thoracic portions of aorta present scattered patches of atheroma. At lower part of abdominal portion, about 1 cm. above the bifurcation, there is a large irregular opening leading to a sacculated aneurism, which projects from the front part of the vessel. The orifice is transversely

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placed, and measures 5 by 3 cm.; the upper margin is sharply defined, the wall of the vessel appearing to terminate at this part. The sac of the aneurism is about the size of an orange, and is full of clots and laminated fibrin, the latter arranged chiefly at the upper and lower regions. The third portion of the duodenum crosses the front of the tumour obliquely, and is closely attached to it. After washing out the sac it is seen to communicate with the bowel by a ragged orifice, 3 by 2 cm., situated about the central part of the transverse portion of the duodenum.

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The iliacs pass off immediately below the sac, and are healthy.

Both stomach and intestines contain blood.

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(b.)—*Small Aneurism of Aorta, compressing Left Bronchus.*

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John H., æt 35, a boiler-maker, admitted July 30th, with cough and difficulty of breathing.

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Patient had been in his usual health until between two and three months ago, when he began to have difficulty of breathing, and a cough, which has lately become so bad that he is unable to lie down at night. He has severe fits of coughing, and expectorates a considerable quantity of yellow muco-pus. The voice is hoarse and rough, and the cough is of somewhat the same character. There is deficient expansion of the left side of the chest; moderate dulness over whole of corresponding lung; the breathing in it very feeble, and accompanied with moist râles at base; over right lung, exaggerated breathing. Heart sounds normal; organ of normal size. After some days he had a violent and sudden attack of dyspnœa, with lividity, which was relieved by stimulants. The cough, with expectoration and dyspnœa, persisted; ultimately, moist râles over all the lung; great depression, with fever

and profuse sweating; and death took place on 11th of August.

Autopsy.—Body that of a medium-sized, moderately well-nourished man. In thorax 10 oz. of turbid fluid in left pleura. *Heart.*—Right chambers distended with blood; wall of left ventricle a little thicker than normal. *Aorta* dilated and atheromatous in ascending parts, and presents several small pouches. From the first part of the thoracic portion, immediately at the termination of the arch, an aneurism, the size of a large walnut, projects forwards, and compresses the left bronchus. The sac, which is almost obliterated by firm layers of fibrin, communicates with the vessel by a small orifice. On slitting up the trachea and bronchi, the tumour is found to compress the left branch, diminishing its calibre at least two-thirds. At one spot it has ulcerated through, and the fibrinous laminæ of the sac are freely exposed. The left lung is heavy, upper lobe slightly crepitant, and very œdematous; lower lobe airless. In the bronchi there is a large amount of purulent fluid.

(c.)—*Aneurism of Thoracic Aorta—Rupture into Left Pleura.*

David K., æt. 48, a sailor, admitted 18th of September, under Dr. Ross, with pain in left side and palpitation of the heart. Has had pain about margins of left costal cartilages for over 12 months. Has now, in addition, severe pain in the dorsal region on both sides, but most intense on the left. It is of a scalding character, increased by lying down and relieved by firm pressure. Skin along course of lower dorsal nerves markedly tender. No tenderness on pressure over the spine itself. On examination of chest, signs of moderate effusion in left pleura. He was tapped, and three pints of clear serum removed. This gave temporary relief, but the pains soon became as severe as before. Heart a little displaced to the right,

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(d.)—*Aneurism of Heart.*

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otherwise normal. No murmur to left of spine posteriorly. Death occurred suddenly, on 21st of October.

Autopsy.—In abdomen, viscera displaced downwards and to the right; diaphragm on left side on a level with costal border. In thorax, left pleura full of serum and clots, 40 oz. of the former, 94 oz. (by weight) of the latter. Lung of this side compressed. *Heart* somewhat enlarged; valves normal. On removal of heart and lungs, a large aneurismal tumour is seen to occupy the posterior mediastinum, involving about two-thirds of the length of the thoracic aorta. The bursting has taken place through a rent in the pleura, 5 cm. in length, situated immediately over the heads of the 6th and 7th ribs of the left side. On removing the tumour, the posterior wall of the sac is found to be the deeply eroded vertebræ, 5th, 6th, 7th and 8th, together with the heads of the corresponding ribs, that of the 7th on the left side being almost eaten away. The bodies of the affected vertebræ are fully one-half destroyed; the intervertebral substance is not so much involved. The sac is very large, fusiform in shape, and contains numerous laminæ of fibrin with much coagulated blood. The œsophagus is displaced forwards but not compressed, nor is there any pressure on the bronchi.

(d).—*Aneurism of Arch of Aorta—Great Hypertrophy of the Heart.*

J. M., aged 40, admitted July 14th, 1878. Had been a soldier for 15 years, serving in various parts of the world. Since his discharge in 1865, has worked as an ordinary labourer. In April, 1876, began to suffer from cough and dyspnœa, and noticed a pulsation in front of chest; he continued at work until July of that year, when he entered the Hospital for the first time. Has lived a hard life; never had syphilis; had rheumatic fever when a lad.

Since the first symptoms appeared he has not been able to work much; the present is his fourth term of residence in the Hospital, and he has been two or three times in the Hôtel-Dieu.

There is great hypertrophy of the heart, apex beat 4 cm. outside of nipple line. Impulse forcible; no murmur. Great prominence of sternal end of right clavicle; visible pulsation in right infra-clavicular region; feeble impulse felt in same locality, stronger one in episternal and supra-clavicular regions. Complains chiefly of pain and dyspnœa. Latterly he became very much wasted, and died exhausted on September 10th.

Autopsy.—On opening the thorax, aneurism occupies the position indicated during life, and is closely attached to the chest wall; the cartilage of the 2nd rib and part of the bone being atrophied from pressure.

Heart greatly enlarged. Right auricle contains clots, some of which are firm and colourless. Superior cava and its branches are normal. Right ventricle much dilated, measuring 15 cm. from pulmonary ring to apex, walls 5 to 8 m. in thickness. Tricuspid orifice enlarged. Septum bulges very much towards this chamber. Left auricle large; endocardium very opaque. Left ventricle somewhat rounded in shape, much dilated and hypertrophied. Length from aortic ring to apex 12 cm. Circumference 19 cm., walls 15 to 20 m. in thickness; papillary muscles and trabeculæ much developed. Mitral orifice slightly enlarged. Aortic valves normal.

Aorta.—Ascending part dilated, measuring 11.5 cm. in circumference; intima rough and atheromatous. The aneurism projects from the right side of the arch, involving the vessel as far as the innominate. The sac is about the size of an orange, and is almost filled with firm laminated clots. The intima of the aorta is prolonged for a short distance into the sac; in the rest of its extent the wall of the sac is thin, and has torn in

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one or two places. The posterior wall of the arch below innominate is rough, and numerous clots adhere to it. Branches of arch normal. Descending aorta thickened and atheromatous. Left vagus is stretched, but can be readily dissected away from the back part of the aneurism. Left recurrent can also be easily followed.

Nothing of special note in the other organs.

2.—*Aneurism of Innominate—Rupture of Saccular Dilatation of Aorta into Pericardium.*

James W., aged 40. Has always been a healthy man, but has done very heavy lifting in his work as undertaker. Admitted April 14th, with pulsating tumour under right clavicle; severe paroxysms of pain in that region; cough and husky voice. Tumour can be felt on deep pressure in the episternal pit. Radial pulses equal. Veins of right arm, and right side of neck, somewhat enlarged. Left Hospital and died suddenly on July 4th.

Autopsy.—On opening thorax, lungs collapse; no fluid in pleuræ.

Pericardium looks large, and on section the heart is seen to be enveloped in a clot of blood which, when removed, about filled the two hands. Surfaces of membrane natural-looking.

Heart flabby; right chambers contain blood and clots. Left ventricle a little large. Mitral valves thick at the edges; aortic valves opaque and stiff, but are competent.

Aorta.—Ascending portion of arch dilated, especially in two saccular pouches just above pulmonary artery. The walls of these dilatations are very thin, and in one there is found a small rupture, about the size of a pin's head, through which the hæmorrhage has taken place into the pericardium. The whole arch is considerably dilated; the intima rough and atheromatous. The orifice of the innominate is slightly dilated, that of the left carotid

very much so. On tracing up the innominate, a sacculated aneurism is found springing from the right side of the vessel, with which it communicates by a narrow orifice 2 by 1.5 cm. The sac is the size of a large orange, and the cavity is more than half filled with dense, decolourized laminæ of fibrin. The wall of the vessel appears to end a short distance from the orifice. The right pneumogastric nerve is involved in the wall of the sac. The subclavian and right carotid arteries are normal.

Remarks.—This case is interesting from the fact that Dr. Fenwick proposed to ligature the carotid and subclavian arteries on the left side for the cure of the aneurism, but was unable to obtain the patient's consent to the operation. So far as the aneurism itself was concerned, no case could have been more favourable; the sac was already half-filled with dense laminæ of fibrin, and the orifice of communication was small; but the sacculated pouches above the aortic valves would probably have been a serious element of danger, and might have burst with the increase of pressure after the application of the ligature to the arteries.

Death took place suddenly, though the opening into the pericardium was very small, just admitting the head of a pin.

3.—*Aneurism of Splenic Artery—Perforation into Transverse Colon.*

E. C., æt 30, came under the care of Dr. Drake on Oct. 6th. He had been ill for several months, suffering with attacks of epigastric pain and occasional vomiting; symptoms which led his physicians in New York to diagnose gastric ulcer. There was a deep-seated tumour in left hypochondriac region, extending for some distance into the epigastrium, the dulness of which merged with that of the spleen. There was no pulsation, but it was

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thought on one occasion that a *bruit* was heard over it. The chief symptoms, while under observation, were vomiting, severe epigastric pain, occasional hematemesis, and, within the last week, severe hæmorrhage from the bowels, which carried him off.

Autopsy, 24 hours after death.—Belly much swollen, and, when opened, about two pints of fluid were removed from peritoneum; coils of intestines distended and covered in spots with flakes of lymph. A tumour occupies the left hypochondriac region, and extends to the level of the navel, being situated between the stomach above and the transverse colon below, both of which organs are firmly adherent to it. It was removed in connection with these parts and the spleen. On section is seen to be an aneurismal tumour, about the size of a cocoa-nut. The greater curvature of the stomach is closely adherent at the upper part, and the sac was opened by a free incision through this organ. The peripheral part is occupied by dense, laminated fibrin, the central and dependent regions by recent clots. The pancreas is adherent to the lower and posterior part. On tracing the splenic artery from the aorta, a probe passes directly from it into the sac, communicating with the central portion by an oblique canal through the laminæ. The artery is somewhat dilated at the site of rupture and presents an irregular deficiency of the wall, beyond which the vessel is thick and runs in the wall of the sac. The proximal part of the artery is normal. On cleaning out the sac an oval orifice, 2 by 1.2 cm., is seen at the lower part, which communicates with the transverse colon near the splenic flexure. It is partially plugged with a fibrinous clot. The edges of the orifice are smooth, and for a short distance about it the sac wall has given way so that the intestine is freely exposed. The spleen is small and flattened, closely enveloping the sac. Heart presents nothing abnormal.

Remarks.—Aneurism of the splenic artery is very rare.

In thirty-nine instances of aneurism of the branches of the abdominal aorta collected by Lebert, it occurred in ten. In the present instance, the situation and large size of the tumour, together with the absence of pulsation and general characters of the symptoms, did not point towards aneurism, and the tumour was believed to be splenic. After hearing a *bruit* over the mass on one occasion, the question of aneurism was discussed.

4.—*Small Aneurism of Renal Artery.*

In a case with some arterial degeneration and slight contraction of the kidneys, there was a small sacular aneurism, the size of a large pea, on the left renal, just before the bifurcation. The sac had firm walls continuous with those of the vessel. No other aneurism in the smaller or larger arteries.

5.—*Four Cases of Intracranial Aneurism.*

(a.)—*Aneurism of the Left Middle Cerebral Artery, projecting into a Cyst, probably the remains of an Infarction—Rupture—Aortic Valve Disease.*

A. B., aged 20, a small, but well-built, young man. Death took place suddenly during the evening of the 25th of March, 1878.

Brain.—Left hemisphere looks larger than the right, the convolutions are flattened, and not so vascular. On section, at the level of the corpus callosum, a large clot occupies the brain substance immediately external to the lateral ventricle in the left side, involving the tubercular nucleus, internal capsule, small part of the thalamus opticus, and laterally reaching nearly to the convolutions of the central lobe. It does not penetrate the ventricle. At the base, vessels of the circle of Willis not atheromatous.

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On tracing the vessels in the left Sylvian fissure, nothing is met with until far in on the under surface of the parietal lobe close to the angle between the convolutions of this and the central lobe. Here a main branch of the vessel appears adherent, and on dissection a nodular mass is surrounded by brain substance in part of its extent, but within is in contact with the apoplectic region. After carefully washing and removing it from the brain substance, an oval body is left, about the size of a cherry, and into this the artery appears to pass. On injecting water into the artery, it escapes from the anterior and upper end of the mass, at which point there is a small rent, 4 m. in length. On slitting up the artery, it is found to expand into a small aneurism, about the size of a pea, with very thin walls. A branch passes out to the right, not far from where the main vessel enters, so that the aneurism appears as if formed at the fork of a vessel. The oval mass, which is situated immediately beyond, and in close connection with the aneurism (indeed, the latter occupies the anterior end of the former), is soft, fluctuating, with tolerably firm, opaque-white walls. When opened the contents are reddish-brown in colour, pulpy, and look like brain matter mixed with blood. After removal of the contents, the cyst is about the size of a cherry; walls 2 m. in thickness. At the anterior end the aneurism projects into it, and the central part of the projection is rough and fibrous, but no communication exists between the cyst and the aneurism.

The *Heart* is hypertrophied, and there is fusion of two of the segments of the aortic valves. Described as case ii at page 235.

(b).—*Endarteritis and Aneurismal Dilatation of Left Vertebral and first part of Basilar Arteries—Rupture.*

J. B., aged 36, a saloon-keeper; found dead in his bed. Eighteen months before he had been attended by Dr. Roddick for a hard chancre, which was followed by severe secondary symptoms. He had, however, completely recovered.

Body that of a well-built, muscular man.

Brain.—In the removal of the organ, a large extravasation is seen at the base, and a considerable amount of serum escapes. A uniform coagulum extends beneath the arachnoid, from the optic commissure in front to the lower part of the medulla behind, concealing all the parts beneath save the ends of the nerves, which pass out through it. Laterally, it extends into the Sylvian fissures; posteriorly it encircles the medulla, and fills the hinder part of the 4th ventricle, and at the back part of the cerebellum it forms a large baggy swelling beneath the arachnoid. It also follows the course of the posterior cerebral and cerebellar arteries, infiltrating the meshes of the pia mater along these vessels. On removing the arachnoid, the clot is found to be thin and superficial over the pons, thicker over the perforated spaces, while over the crura and medulla it forms a thin sheet.

On tracing the vessels a very great disparity in size is seen between the vertebral arteries. The left is very small, only 7 m. in circumference; the right large, 1.2 cm. in circumference, and with thickened walls. The first part of the basilar is also dilated, and its wall thick and opaque. On injecting water into the left vertebral, an oozing is seen just at the point of union of this vessel with the basilar, on the outer side, at a spot where there is a slight prominence on the wall. When the left vertebral is slit up, it measures at its widest part 17 m., the coats are thick, intima smooth, but beneath it are patches

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of opacity. In some places there is a peculiar greyish translucency. Just above where this vessel joins the basilar is a shallow dilatation on the wall, and in the centre of this is a small perforation through which an average sized bristle can pass. At the central part of the basilar artery, the interior is much thickened, and the lumen of the tube is considerably narrowed.

The carotids are a little stiff, but not evidently atheromatous. The middle cerebrals present a few small spots of opacity on the intima.

Heart is healthy.

Aorta not atheromatous. Small arteries of various viscera not affected.

On microscopical examination there were no special features in diseased arteries, which would warrant the conclusion that the process was syphilitic.

(c.)—*Aneurism on Left Middle Cerebral Artery—Old Apoplectic Cyst—Numerous Miliary Aneurisms.*

R. C., æt. 55, patient of Dr. A. A. Browne's; ill for over eighteen months with obscure cerebral symptoms. At autopsy, old apoplectic cyst, with firm walls, in which, and in neighbouring brain tissue, were numerous miliary aneurisms. No large dilatations in the vessels near the cyst. Vessels at the base very stiff and atheromatous; just beyond the first division of the left middle cerebral there is a saccular aneurism about the size of a large pea, communicating with the vessel by a round orifice. The wall of the sac is thick, and appears to be an extension of the tunics of the vessel. It had not ruptured. A smaller and more irregular dilatation exists in one of the main branches of the right middle cerebral. Heart valves not diseased.

(d.)—*Aneurism of Anterior Communicating Branch of Circle Willis; Rupture.*

Mrs. G., æt. 40, died suddenly in a shop, and was brought to the dead-house of the Hospital.

No history was obtained of her habits of life.

Autopsy.—Body that of a well-nourished woman. Nothing of note on external examination. On removing the calvaria dura mater looks natural. When stripped off, superficial extravasations are seen bounding the longitudinal fissure and extending along the sulci. They are numerous in the lateral region in the course of the branches of the Sylvian arteries. When removed, the base of the organ presents a uniform clot extending beneath the arachnoid from the medulla to the olfactory bulbs. The white ends of the nerves project through, and relieve the otherwise uniformly dark-red colour. The clot passes out the Sylvian fissures, and covers the upper and lateral surfaces of the cerebellum. It forms a thin sheeting, thickest over chiasma. It has not burst through the arachnoid at any point. The clot was carefully brushed away and the vessels inspected. They are not thickened, but present one or two small spots of atheroma on the basilar and middle cerebrals. A slight fulness was noticed about the anterior communicating artery, and on injecting water with a hypodermic syringe through the carotid, it flowed out in a tiny stream from the front of this vessel, revealing at the same time a small aneurismal dilatation springing from it. The circle of Willis was then carefully removed, washed, and spread upon a glass plate; the anterior communicating artery is seen to be very wide, and projecting from it, between the anterior cerebrals, is a aneurismal pouch, about the size of a small split pea. Its walls are very thin, and on its under surface there is a small slit-like rupture 1·5 m. in length. When opened from the anterior communicating

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artery, a small smooth-walled sac is seen, very thin towards the anterior part. On the upper wall there is a small spot of atheroma, and another on the anterior communicating; they are greyish-white in colour, intima over them smooth.

Other vessels carefully examined, but nothing special found: the strio-lenticular arteries were much coiled.

Nothing special was found in the dissection of the *Abdomen*; lacteals beautifully injected with chyle over intestines—duodenum and jejunum—and mesentery. In *Thorax*, viscera normal; right lung universally adherent. *Heart* of natural size; valves normal. Tricuspid orifice large, 13·5 cm. in circumference. *Aorta* rough and uneven from atheromatous change; branches not much affected. *Kidneys* a little granular on surface. Right organ is very loosely attached and is very movable; it can readily be displaced to the brim of the pelvis.

Remarks.—Aneurismal dilatations on branches of cerebral arteries are not at all uncommon. Within the past ten years several observers have taken the trouble to collect and summarize the facts connected with them. Thus, Dr. Hutchinson reports one and analyses 84 cases; Dr. Bartholow describes an original case and analyses 114; and lastly, Dr. Peacock reports 3 cases and tabulates 86. The points of interest which have been brought out in connection with this accumulating record are: their comparative prevalence in young persons with valvular disease, and their probable origin in embolism. The statement of Sir William Gull that apoplexy in young persons is very frequently caused by the rupture of small intra-cranial aneurisms, has been borne out by many sub-

1. Pennsylvania Hospital Reports. Vol. ii. 1869.
2. Am. Journ. of Med. Science. 1872.
3. St. Thomas's Hospital Reports. 1876.
4. Guy's Hospital Reports. 1859.

sequent observers; and in Case *a* I remarked to my class, before proceeding with the autopsy, on the probability of finding a ruptured cerebral aneurism, as the lad was known to have heart disease.

The embolic origin of these aneurisms has been discussed of late, and is probably true in those associated with endocarditis. The frequency with which they occur with heart disease,—25 out of 89 in Dr. Peacock's table, the preference displayed for the arteries of the left side, and the occurrence of accompanying embolic lesions in the spleen and kidneys are suggestive facts. The way in which embolism causes aneurism has not been determined. The view commonly advanced is that the arterial wall is softened at the point of plugging and gradually dilates. Ponfick¹ thinks that the hard particles of a calcareous embolus injure the wall and weaken it; Goodhart,² on the other hand, believes that the embolus is, in the majority of cases, derived from an ulcerative endocarditis, and carries with it infective properties, leading to inflammation and softening of the arterial wall.

In Case *a* the connection of the aneurism with a cyst is worth noting. Was this cyst the result of an embolus? It looked very much like a spot of red softening in process of healing, and the sac of the aneurism projects directly into it, while passing out, somewhat at right angles, is the continuation of the vessel. It is too large to have been caused by the pressure of the aneurism itself. I am inclined to think that it preceded the formation of the aneurism, in which case it has probably resulted from an embolus plugging a branch of the vessel at this point.

Of five cases of intra-cranial aneurisms which have come under my notice, Case *a* is the only one occurring in a young person and in connection with heart disease.

1. Virchow's Archiv. 1873.

2. Path. Soc. Transactions. 1877.

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The other instance, not given in this series, is recorded in my first Pathological Report, 1878, and occurred in a woman aged 40; the aneurism involved the right middle cerebral, and was the size of a bean.

In 4 of the 5 cases death was caused by bursting of the sac, in 3 death was sudden; the woman with aneurism of the right middle cerebral lived 36 hours after the onset of the paralysis.

Aneurism of the anterior communicating branch occurred in only 5 of the cases tabulated by Dr. Peacock; the sac in this case appears to have been smaller than in the other recorded instances.

6.—*Aneurisms of Branches of Pulmonary Artery on Wall of Cavities—Hæmoptysis in Chronic Phthisis.*

(a.) Mary T., æt. 50, ill for many months; died suddenly from hæmoptysis.

Lungs—Cavities at apices; that of left lung the size of a large orange, thin-walled, and presents at its lower and inner aspect, close to the root of the lung, an aneurismal dilatation of a branch of the pulmonary artery. It is as large as a marble, and is quite close to the main trunk of the artery, being given off directly from one of the three main sub-divisions going to the upper lobe. The orifice of the sac is larger than a goose quill. It lies in a definite hollow, which looks as if it might have been formed by the constant throbbing of the sac. It measures 2·8 cm. in length, 4·5 cm. in circumference. The portion near the root is covered with the lining membrane of the cavity, and two small trabeculae cross it. The anterior portion looks arterial in character. At the apex there is a small laceration through which water flows into the cavity when injected into the sac. On the under surface of the sac is a small spot of ulceration with a yellow base.

(b.) J. A., æt. 26, the subject of chronic phthisis. Death from hæmoptysis.

Right Lung.—Cavity the size of an orange at the apex. At the posterior part of the lung, at the level of the root, is another cavity the size of a hen's egg, full of soft clots, of a dark colour. On washing these away an aneurismal sac is seen projecting into the cavity, oval in shape, 2.5 cm. in length, 1.8 cm. in width, lying with its long axis transversely to that of the thorax. Its anterior surface is smooth, rounded, and internally is thickened by laminae of fibrin. The posterior surface is very thin and presents several small openings, through which the hæmorrhage had taken place.

7.—Two cases of Hypertrophy of the Heart.

(a.) William B., æt. 63, a large, powerfully built man, carpenter by trade, was admitted into the Hospital Sept. 18th, complaining of cough and dyspnœa. Has been a healthy man, accustomed all his life to hard work, and until about two years ago had drunk freely. In October, 1877, caught cold from wearing wet clothes, and was off work for five weeks. In May was laid up with cough, and had, at the same time, swelled feet. Was in Hospital for five weeks. Has worked continuously since that time until the 12th of September, when he had to give up on account of the shortness of breath and swelled feet.

On examination, chest measures 80 cm.; expansion, 2.5 cm.; both sides equally well. Percussion over lungs normal. Nothing special on auscultation.

Heart's dulness begins at 4th rib and extends fully 1.5 cm. outside of nipple line. Action rapid; sounds muffled; no murmur. Urine rather dark-coloured; no albumen. He has a troublesome and frequent hacking cough; expectoration of a bright red colour and like currant jelly. Sits up in bed most of the time. Legs

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and feet cedematous; small amount of fluid in the belly. On 24th dull and heavy; dyspnœa more urgent. Expectoration bloody. In evening became insensible, almost pulseless, and extremities cold. From this state he was roused with stimulants. 25th.—Insensible and quiet. Œdema is extending. Expectoration remains the same. Dyspnœa became more exaggerated, and he died on the 29th.

Autopsy.—Body presents the appearance of a man dead of heart disease. In abdomen, small amount of fluid. In right pleura, 60 oz.; in left, 30 oz. clear serum. In pericardium, 8 oz.

Heart large, weighs 710 grams. (ca. 25 oz.) Right chambers distended with large, jelly-like clots. Ventricle dilated, measuring from pulmonary ring to apex, 12 cm. Circumference, midway between pulmonary ring and apex, 12 cm. Tricuspid orifice dilated, 15 cm. in circumference. Segments of valve healthy; pulmonary valves normal. Left auricle large, and contains blood, with clots. Left ventricle dilated and contains gelatinous clots; those about the trabeculæ are colourless. Length of chamber from aortic ring to apex, 10 cm.; circumference, at middle, 17.5 cm. Anterior wall, central part, 2.2 cm. in thickness. Papillary muscles a little fibroid at apices. Mitral orifice 12.5 cm. in circumference; valves a little thickened at edges. Aortic ring 8.2 cm. in circumference; valves competent, a little thickened, and one calcareous nodule at attached margin. Muscle substance is somewhat pale; fibres are moderately fatty, and present also many brown granules. Aorta is not dilated; 5 cm. above valve it measures 8.7 cm. in circumference; intima smooth, not atheromatous in ascending part of arch. A few patches in transverse part of arch, and in thoracic portion, and a large one in right common iliac.

Lungs present large spots of apoplexy. Anterior borders emphysematous. Tissue on section presents coarse appearance of brown atrophy.

Kidneys.—Right 130 grams.; left, 175. Capsules detach with slight difficulty; surfaces a little puckered and irregular. Several cysts the size of marbles. On section cortices not diminished; vessels full; small arteries moderately distinct.

Liver, nutmeg.

Brain presents nothing abnormal; arteries at base opaque, but not rigid.

(b.) Thomas L., æt. 68, a strong, well-built man for his age, carpenter by trade, was admitted to hospital May 14th, with shortness of breath, cough, and anasarca. Has always been a healthy man; worked hard at his trade; no history of intemperance. Began to be troubled with shortness of breath upon exertion about a year ago. Six months past feet began to swell, and he had often to sit up at night in order to breathe freely; spat a little blood at this time. Becoming worse, was admitted to hospital in September for heart disease, and was discharged in six weeks much improved. Has not been able to do much work during the winter, on account of the shortness of breath. About a month ago his legs began to swell, and since then the dropsy has gradually extended. When admitted, dropsy of legs, scrotum, and belly. In chest, signs of effusion into pleura behind. Percussion clear over anterior parts of lungs. Heart dulness extends as high as upper border of third rib; diastolic murmur heard at the base. Arteries atheromatous. Urine in normal quantities; trace of albumen. Chest was tapped on two occasions, and he left the hospital on Aug. 10th, much improved. On Oct. 11th, he was admitted moribund, and died the next day.

Autopsy.—Body that of a short, moderately stout man. Œdema of legs and subcutaneous tissue of trunk. In abdomen, slight amount of fluid. Membrane much thickened. Right pleural layers universally adherent. *Pericardium* contains 8 oz. of fluid. *Heart* greatly enlarged;

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right chambers dilated, and contain gelatinous clots, with blood, 18 oz. being removed in the preliminary inspection of these cavities. In left ventricle only small amount of blood; 4 oz. removed from left auricle. Right ventricle measures from pulmonary ring to apex 12.5 cm.; walls 6 to 10 m. in thickness. Tricuspid orifice dilated; heart cone 15 cm. in circumference, passes through freely; valves normal. Left ventricle measures from aortic ring to apex 12.5 cm.; walls 1.8 to 2 cm. Mitral orifice 12 cm. in circumference; valves a little thick at edges. Papillary muscles firm at apices. Aortic orifice 8.5 cm. in circumference; valves a little stiff. Aorta slightly dilated, and presents several patches of atheroma. Muscle substance of heart a little pale, and on examination many of the fibres are fatty and in a state of brown atrophy. *Lungs*.—Left is compressed posteriorly, crepitant above and emphysematous at anterior border. Right lung heavy, very slightly crepitant, and on section, contains much blood and serum; no infarcts. *Kidneys*.—Right weighs 173 grams.; capsule not adherent; surface smooth; on section, cortex in good proportion; small arteries at base of pyramids not very distinct, no cysts. Left organ smaller, weighs 160 grams. Capsule detaches readily: surface presents numerous small cysts. On section, certain areas of cortex are riddled with small cysts. Pyramids look natural. Liver, nutmeg. Nothing special in other organs. Smaller arteries of the body atheromatous, not calcareous.

Remarks.—Fatal cases of heart disease are met with now and then in which it is exceedingly difficult to account, in a satisfactory manner, for the occurrence of the hypertrophy and dilatation. The patients die with all the symptoms of chronic valvular disease—dyspnoea, dropsy, hæmoptysis, &c. At the autopsy there is no affection of the valves, perhaps only moderate arterial degeneration. the kidneys are not specially fibroid, and there is not sufficient pulmonary trouble to account for the general

hypertrophy of the heart. Three such cases have come under my notice in the past three years and I have another at present under observation. In the two cases just reported, neither the condition of the valves of the heart, of the lungs, or of the kidneys, afford satisfactory ground for supposing that the hypertrophy and dilatation were caused by any interference with the functions of these organs. In the first case one kidney was reduced in size, and the surface of both were a little puckered; the lungs contained numerous hæmorrhagic infarcts, and were emphysematous in anterior borders. The arteries were not atheromatous; indeed, for a man of his age, the aorta was remarkably free from changes. In the second case, kidneys were of normal size; one was cystic. The lungs were emphysematous in front; the arteries were sclerotic, and the aorta somewhat dilated. In both there was general hypertrophy with dilatation of the heart, the valves being a little thickened, but otherwise normal. The degree of enlargement of the organ was about that met with in cases of hypertrophy from valve disease. The mitral orifices were moderately enlarged, 2 cm. beyond the standard; the tricuspid orifices somewhat more, 3 cm. in excess of Bizot's measurements; but in neither case, perhaps, was the excess out of proportion to the increased size of the chambers. Now, in the absence of the usual and well recognized causes, what conditions are there which might be supposed to have given rise to hypertrophy and dilatation of the heart in these cases? There is no evidence of disturbed innervation, which appears capable of inducing enlargement of the organ, as in cases of nervous palpitation and in Graves' disease.

All circumstances which tend to produce, and keep up, a state of high tension in the arterial system may lead to dilatation and hypertrophy of the heart. It is in this condition that we must, I think, seek for the explanation of the disease in these cases. Among such circumstances

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severe muscular exertion takes a prominent place, and the writings of Albutt, Meyers, DaCosta, Seitz and others on the subject leave no room for doubt that hypertrophy of the heart may arise from this cause. I have dealt with the question at length in commenting on the first case referred to¹, which resembled these in the absence of valvular disease and the method of termination, and which occurred in a very powerfully built man (æet. 38), of intemperate habits, an old soldier, and a blacksmith by occupation. In the cases here reported, the patients were large, muscular men, carpenters by trade; one of intemperate habits, the other doubtful; no history of syphilis, and it appears quite legitimate to connect their habits of life with the disease. The intemperance in Case *a* is a factor not to be lost sight of, as the action of alcohol in increasing arterial tension is recognized, and it is worthy of note that many of these cases have been in hard-drinking, intemperate men.

This view, however, is open to the just criticism that there is no direct evidence in its favour; and the question also at once suggests itself: How is it, seeing that the majority of men earn their bread by the "sweat of their brow," that these cases are not more common? Still it is only right to take into consideration the facts of well developed muscles and hard work at a trade which often necessitates severe exertion, sometimes in constrained positions, when the usual conditions causing dilatation and hypertrophy of the heart are absent; more particularly with the evidence collected in favour of this view by the above named gentlemen.

Having so recently written on the subject, in the paper referred to, I will not again, at present, enter into the

1. On a case of Hypertrophy and Dilatation of the Heart, probably caused by prolonged muscular exertion.—*Canada Medical and Surgical Journal*, March, 1878.

2. Traube, *Gesammelte Belträge*. Bd. III., 1878.

question, though one of very great interest. I will only remark that in Case *b* the arterial sclerosis might be regarded as the cause of the heart disease; or, with Traube, both might be looked upon as effects of a common cause, viz., increased arterial tension in consequence of muscular exertion and the abuse of alcohol.

8.—*Perforation of Pulmonary Artery by Ulcer of Left Bronchus—Sudden Death from Hemoptysis—Chronic Bronchitis, Emphysema, Phthisis.*

A. M., æt. 54. Had been asthmatic for several years, and subject to severe paroxysms of cough and dyspnoea. Face always dusky, breath short and wheezy. Never had hæmoptysis. On the morning of the 15th of April, 1879, he coughed up a quantity of blood, somewhat over a pint, and fell back dead.

Larynx contains a small amount of blood.

In *trachea*, there are small clots and frothy blood. The mucous membrane is thickened, rough, and irregular, particularly towards the bifurcation, and whole tube looks unusually thick and stiff. The orifices of the mucous glands are very distinct. On slitting up the bronchi, the left is found filled with clots and blood; the right is almost free. When washed, the mucous membrane, particularly that of the left, is much thickened—2 to 3 m.—and rough from the projection of little masses like coarse granulations, which are more numerous on the posterior than the anterior parts. The main division of the left bronchus, with its branches passing to the upper lobe is specially affected, and the granulations are very numerous and large at the points of bifurcation. On the upper and outer wall of this division of the left bronchus, just before its bifurcation into the tubes for the upper lobe, there is a reddish spot on the mucosa, 7 m. in diameter, projecting slightly towards the lumen of the bronchus, and for a

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millimetre or more about it the mucosa appears ulcerated. The reddish spot is composed of a soft yielding membrane, the surface of which is a little rough, and when depressed it is below the level of the bronchial mucous membrane, and looks like a small ulcer upon it. The loss of substance is best seen at the edges, and here the cartilages are seen to be deficient. On inspection it is found that this reddish membrane forms a septum between the bronchus and the pulmonary artery; and, at the lower part, rupture has taken place by a slit-like orifice 2·5 m in length. From the side of the artery—left branch, main division, close to bifurcation—there is seen a circular reddish spot on the yellowish-white intima, 5 m. in diameter, a little depressed, membrane roughened, but not covered with fibrin, and at its lower margin is the slit above referred to.

Lungs.—The left presents a thickened pleura over upper lobe; on section this part presents three cavities of moderate size, in communication with dilated bronchi; and all containing clots. The anterior margin is firm, contains groups of tubercles, the surrounding tissue being in a state of gelatinous infiltration. Lower lobe in latter region presents an infarction the size of a walnut, somewhat triangular in shape, brownish-red in colour, dry, not softening, and the pleura over it inflamed. On slitting up the branch of the pulmonary artery passing to this part, one or two roughened spots are seen on the intima, but they do not look recent. The embolus was not discovered. The rest of this lobe is emphysematous. The right lung is large, borders rounded, tissue spongy and soft to the touch. On section there are a few groups of tubercles scattered through the lobes, and the tissue is extremely emphysematous.

Heart.—Right ventricle moderately hypertrophied, and tricuspid orifice dilated.

Spleen enlarged, weighs 383 grams.

9.—*Instance of four Pulmonary Valves.*

The case from which this specimen was obtained, presented no features of special interest.

Pulmonary ring measures 7 cm. in circumference, and is provided with four well-formed valves. They are smaller than normal, measuring respectively 2, 1·8, 1·8, and 1·4 cm. along the free border. The largest one is a little thickened; all are fenestrated; two of them present at both angles very large perforations.

10.—*Bayonet Wound of Left Subclavian Artery at its Origin.*

J. McE., aged 24, stabbed with a bayonet on the eve of the 12th of July, by one of the Volunteer guards at the City Hall.

On external inspection, the only point of note is a wound 2 by 1 cm., situated in front, and a little to the outer side, of the external axillary fold. The edges are contused and lacerated, and, on pressure, blood exudes.

On removing the sternum, left pleural sac is found full of blood, partly coagulated, of which two quarts were removed. The lung was compressed and flattened. On tracing the external wound it is found to penetrate part of the deltoid muscle, passing just in front of the axillary vein, then beneath the pectoralis minor, and enters the chest immediately below the 1st rib, 7 cm. from the sternum, grooving the border. It then passes directly through the upper lobe of the lung, penetrates the pleura covering the posterior mediastinum, and cuts across the left subclavian artery 1·2 cm. from its origin on the arch, severing the vessel in three-fourths of its extent. The tissues of the posterior mediastinum are infiltrated with blood.

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11.—*Fatty Degeneration of Heart in Diphtheria—Sudden Death on the thirteenth day.*

E. A., æt. 11; admitted, under Dr. Ross, on 16th of January, with diphtheria; membrane upon tonsils, uvula, and pillars of fauces; pulse, 120; temperature, 104°. By the 24th the throat had almost healed, temperature normal; voice is nasal, and there is a slight regurgitation of fluids through nostrils.

25th.—Not so well, is irritable and restless; skin of legs, particularly on front of thighs, *hyperæsthetic*. Temperature normal.

At 5:30 P.M., after sitting up on the bed-pan for a few moments, gave a long sigh and fell back dead.

Autopsy.—Larynx and pharynx free from exudation.

Heart moderately contracted; valves normal. Right auricle contains a large, white, tolerably firm clot, which almost fills the chamber, and extends into the corresponding ventricle. It does not pass into the pulmonary artery. Muscle substance of fairly good colour, but when examined with the microscope is found in a state of advanced fatty degeneration. Very many of the fibres appear made up of closely set, dark, fat granules, no trace of contractile substance remaining; in others the process is less advanced, but I have never seen more extreme degeneration than is shown by numerous fibres from the ventricle in this case.

Kidneys moderately congested.

12.—*Two Cases of Thrombosis of Pulmonary Artery.*

(a.) *Fracture of Patella—Pleuro-Pneumonia (?) seven weeks after—Thrombosis of Pulmonary Artery.*

Dr. Rodger, under whose care the patient was, has furnished notes of the case, from which the following has been condensed:—

J. B., æt. 45; a tall, powerfully-built man. Fractured his patella on the 20th of December. On 4th of February initial symptoms of pleurisy; moderate fever; respirations 40. On the 5th, faint pleuritic friction on right side posteriorly and a few râles. 7th.—Temperature 100.3° . Is restless and complains of a sense of suffocation or tightness in the chest, and difficulty of breathing has increased. No dulness to be detected posteriorly. 10th.—Still complains of sense of tightness on chest. Has continued feverish. Temperature to-day 101° . Pain in side very severe; had a hypodermic of morphia in the evening. Respirations 40 in the minute. 12th.—Had a bad night. Temperature, 102.3° ; respirations, 50. Diminished resonance at angles of scapulæ; breath sounds indefinite. Heart's action tumultuous; no murmur. Had a slight syncopal attack in the afternoon on sitting up. 14th.—Summoned early in the morning, patient having been very restless. Pulse, 120. Temperature, 100° ; respirations, 45. Complains of severe pain at lower end of sternum and also immediately below right nipple, and of the feeling of tightness before referred to. At midnight patient said he felt better, and was about to have a poultice applied when he was seized with a syncopal attack, and died in a few minutes.

Autopsy, 16 hours after death.

Patella fractured in transverse direction; segments united by fibrous tissue. Under surface of the bone is rough; some of the synovial folds are injected, in spots almost hæmorrhagic, others are infiltrated with a greenish-yellow serum.

Heart of average size. Right auricle contains a gelatinous clot, decolourized at upper part. Chamber does not appear distended; endocardium is stained. Right ventricle contains a small, tolerably firm, buff-coloured clot, closely interwoven with the chordæ tendineæ; there is also a small quantity of dark blood. Valves normal.

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Tricuspid orifice of moderate size. On slitting up the pulmonary artery a firm thrombus occupies the trunk, being adherent to the lower wall; it extends into the right and left branches, not entirely filling their lumina, but is closely adherent where it is in contact with the intima. On further dissection, the thrombi can be followed into many of the branches of the 3rd and 4th degrees. They are all reddish-brown in colour, firm, more or less adherent to the walls, not laminated, and of leathery consistence throughout. Left auricle contains a small amount of blood. Nothing special about left ventricle: a small clot fills the mitral orifice.

In *Right Pleura*, half a pint of turbid serum. Lymph over lower lobe of the lung and on the corresponding parietal layer. One or two small patches on pleura of upper lobe.

Lungs.—Upper lobes crepitant and of good colour. Right lower lobe is heavy, and dark in colour posteriorly. On section a quantity of blood and serum oozes from the surface, and in one or two spots the tissue is firm and of a lighter red colour, as if becoming hepatized. No localized sub-pleural infarctions. Left lower lobe also dark and slightly crepitant. No hepatization.

Nothing of note in the other organs

(b.)—*Thrombosis of Branches of Right Pulmonary Artery.*

Catherine C., æt. 70, admitted 23rd of June, with cough, dyspnoea and swelled legs.

Patient is an old woman of spare habit of body, temperate, but with stiff arteries and an hypertrophied heart. About two weeks ago she caught cold and her legs began to swell. On 24th, when examined, the following facts were noted:—She sits up in bed; face somewhat suffused; respirations hurried; pulse weak and irregular. On inspection, chest barrel-shaped, expansion slight. On



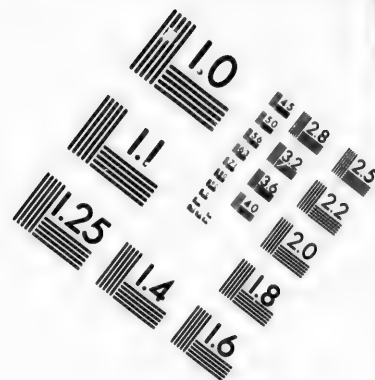
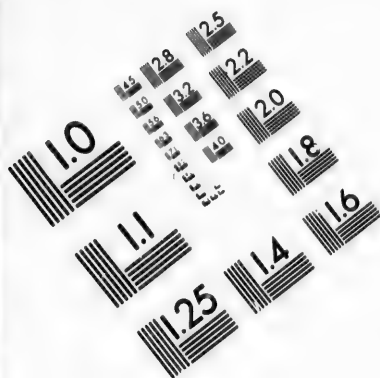
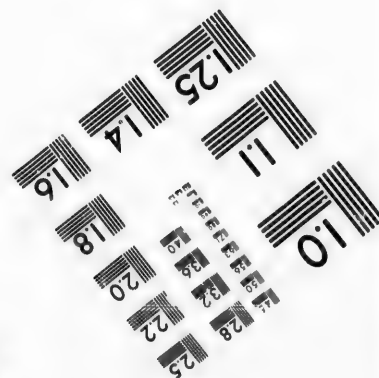
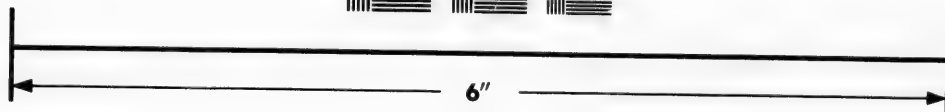
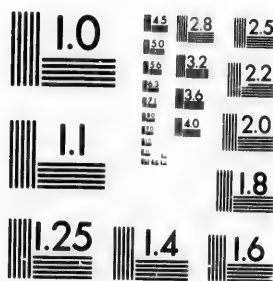
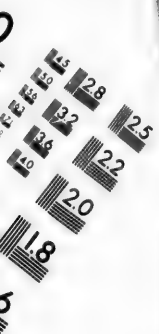


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percussion, dulness in lower part of mammary, infra-axillary and infra-scapular regions of right side, clear note over remainder of chest. On auscultation, fine râles are heard over dull region; expectoration bloody. Heart—Action rapid, irregular; no murmur. Urine scanty; 8 oz. since admission. No albumen. Temperature, 99·5°. Dyspnoea increased, and the patient died on the morning of the 25th.

Autopsy.—Body that of an old, poorly-nourished woman. In right pleura, 14 oz. of turbid blood-stained fluid; in left, 10 oz.

Heart is large and chambers are distended with blood. Right auricle full of gelatinous clots, colourless at upper surface; in appendix they are buff-coloured, closely adherent, and interwoven with the muscoli pectinati. Right ventricle is dilated; walls of average thickness. A gelatinous clot fills the chamber and extends to the pulmonary orifice, but it is not very closely adherent to the valves and chordæ. Tricuspid orifice admits readily the heart cone of 15 cm. circumference. Left chambers contain dark clots; ventricle is large, wall hypertrophied, measuring 1·4 to 1·6 cm. muscle substance pale and streaky. Mitral and aortic semilunar valves opaque and stiff; the latter competent. Weight of organ, 430 grams. In its removal 24 oz. of blood escaped. On slitting up pulmonary artery and its branches, a thrombus is seen to occupy the branch passing to the lower lobe of the right lung. It is firm, buff-coloured, closely adherent to the wall, and can be followed into the branches for a considerable distance, in some instances preserving its characters in vessels 3 m. in diameter, in others being softer and not so closely adherent to the intima.

Right Lung.—Upper and middle lobes crepitant, but contain an excess of serum, which oozes freely from the cut surface. Entire lower lobe is solid, airless, and dark in colour, particularly at anterior and lower borders.

Pleura covered with lymph. Black colour over the upper

Left Lung.—Serum. A wedge-shaped artery in it

Both organs. *Kidneys* the cortical

Arteries dilated.

Remarks. interest.

and on local and Trans frequently a healthy and did work of pleurisy of tightness continued heart's action must suppress formation of breathing apparatus by it, as the trouble.

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Pleura covering it is turbid and presents a few flakes of lymph. On section, the tissue is firm, of a deep, purple-black colour, and in a state of hæmorrhagic infarction; the upper margin of the lobe is slightly crepitant.

Left Lung is crepitant, and contains much blood and serum. At the anterior margin of lower lobe there is a wedge-shaped infarction, and the branch of the pulmonary artery in it contains a thrombus.

Both organs emphysematous.

Kidneys small, fibroid, and present numerous cysts in the cortical regions.

Arteries are atheromatous; arch of aorta is slightly dilated.

Remarks.—These two cases present several points of interest. The cause of the thrombosis in both is obscure, and on looking over the reports of cases in the Journals and Transactions, I have been surprised to find how frequently the same admission is made. In the first case, a healthy man fractures his patella, on December 20th, and did well until the 4th of February, when symptoms of pleurisy set in, with moderate fever. On 7th, sensation of tightness in chest and difficulty of breathing, which continued for a week; respirations 40 to 45 per minute; heart's action tumultuous. Death sudden, on 14th. We must suppose the thrombus to have been in process of formation during the week preceding death, and the rapid breathing and sense of suffocation were probably caused by it, as they were quite out of proportion to the pleuritic trouble.

In the second case, an old woman with contracted kidneys, stiff arteries and hypertrophied heart, is brought to the Hospital with consolidation of lower lobe of right lung, and dies in 36 hours. In neither case is there any satisfactory reason for the occurrence of the thrombosis; perhaps, in Case *b*, a fibrinous concretion may have been dislodged from between the muscoli pectinati of the right

auricle, and plugged the branch of the pulmonary artery passing to the right lower lobe, but the appearance of the obstructing clot was that of a thrombus.

The occurrence of hæmorrhagic infarction in one case and its absence in the other is noteworthy, but it would take too long to enter here upon the consideration of the explanation offered of this interesting but not uncommon peculiarity.

RESPIRATORY SYSTEM.

1.—*Edema of Right Lung ; Hydrothorax of Left Pleura—Contracted Kidneys.*

R. F., a stout, old man, was sent to the Hospital from the House of Refuge, suffering from dyspnœa, which became more and more urgent. He refused all treatment, and died within 30 hours of admission.

Autopsy.—Slight œdema of legs.

Five pints of clear fluid in left pleura; on right side membranes are intimately united.

Heart.—Chambers on right side filled with partially decolourized. Tricuspid orifice dilated. Left ventricle moderately hypertrophied. Valves competent.

Lungs.—Left, emphysematous at apex and anterior border. Lower lobe collapsed, and dark in colour. On section, a moderate quantity of serous fluid escapes from upper part of the organ. Pleura over it smooth. Right, large, heavy, and sodden, pits on pressure, and when handled crepitates faintly. The pleuritic adhesions, which entirely cover it, are infiltrated with serum. On section, entire organ from apex to base intensely œdematous, quantities of clear fluid flowing from the cut surface. Blood vessels are not injected, but the tissue has a translucent gelatinous look from the amount of serous infiltration.

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Kidneys.—Diminished in size; substance very firm. Cortices slightly wasted. Small arteries moderately prominent.

Aorta very atheromatous; small arteries thickened and firm.

2.—*Edema of Left Lung—Morphia Poisoning.*

A. B., aged 40. Disappeared on Saturday, December 14th; found in his own shed, lying coiled up at the bottom of a sleigh, on his left side, with a sheet drawn over him.

Autopsy.—Body that of a tall, muscular man. Limbs stiff from the frost. Face suffused. Slight *post-mortem* discolouration of the skin.

In thorax, a few adhesions between the pleural membranes on both sides.

Heart of normal size; right chambers distended with blood. Tricuspid orifice large, admitting four fingers to 2nd joint. Right ventricle is dilated, walls relaxed; clots are partially decolourized, and extend into the pulmonary artery. Left chambers contain very little blood; ventricle contracted, walls thick, cavity small. Valves normal.

Aorta contains blood; *intima* not stained.

Lungs.—Right, crepitant throughout; some œdema in posterior parts, and the tissue is here dark from contained blood. Left, heavy, dark-purplish in colour, non-crepitant, except at anterior margins. Pleura smooth. On inflation, air vesicles expand in places. Portions excised sink. On section, an extraordinary quantity of bloody serum escapes, and the tissue has a gelatinous, infiltrated appearance. Surface is smooth, not granular, and of a deep-claret colour. It presents a remarkable contrast to the other lung. Bronchi contain frothy serum.

Kidneys.—Left organ contains a good deal more blood than the right.

Nothing special in the other viscera or in the brain.

In the analysis of the contents of the stomach a small amount of morphia was found.

Remarks.—The condition of the left lung in this case was remarkable. I have never before seen an organ so infiltrated with bloody serum; it had a uniform purplish-red, gelatinous appearance, except at anterior border. Death undoubtedly was caused by morphia; and the only explanation which suggests itself of the condition of the lung is, that, lying coiled up on his left side, he went to sleep under the influence of the drug and death took place slowly. The gradually weakened heart propelled feeble charges into the pulmonary artery, and by hypostasis an increasing quantity reached the left lung, until a state of extreme congestive œdema was produced. Medico-legally the case is interesting. In a subsequent case of morphia poisoning—during a pneumonia—there was no special œdema at bases of lungs.

3.—*Pneumonia—Ulcerative Endocarditis—Meningitis.*

Mary —, æt. 29; admitted October 22nd in an unconscious state. History of attack defective; but she had been drinking hard. When examined, on 23rd, she was unconscious; pupils moderately dilated. No twitchings or paralysis. Slight dulness at right apex, with râles. Temperature, 104°. She remained in this state on the 24th and 25th. Systolic murmur over heart. On the 26th temperature went up to 107°, and death took place in the afternoon.

Autopsy.—

Lungs.—Right, heavy and firm, particularly in upper parts. On section, upper lobe, with exception of extreme apex, in state of red hepatization; surface bathed with a blood-tinged serum, and air vesicles filled with visible granules. Toward the anterior border the process is more advanced, the tissue grey in colour, and bathed with a

sero-purulent; localized areas of thorough

Heart.

thicker than normal. Endocarditis of mitral valve, with vegetation, larger than normal, down the surface of the valve, cm., covering extent of the valve. Defect, oval, attached to the others. Pouches of the valve, marble.

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Brain.—

dura mater, base of the brain, slight opacity of the cerebellum, perforated by the œdematous lymph at the base of the mater the somewhat of the neighbour exist on the and another side, in the

sero-purulent fluid. Upper part of lower lobe also hepatised; lower part congested and œdematous, and scattered areas of consolidation are seen in it. Left organ crepitant throughout; congested and œdematous in posterior parts.

Heart.—Left ventricle of normal size, walls a little thicker than natural; endocardium smooth and glistening. Endocardium on ventricular surface of anterior segment of mitral valve is granular, being covered with minute vegetations. Towards the right side of the valve they are larger and extend to some of the chordæ tendineæ, passing down the entire length of several of them. On the auricular surface of the valve there is a soft, white patch, 1 by 1·2 cm., covered in part by a thin membrane, and in rest of extent rough and divided into a number of elevated projections. In one of the aortic valves there is a slight defect, owing to the fact that the free margin at one end is attached to the aorta considerably below the level of the others. Above the sinuses of Valsalva are several small pouches of the arterial wall, the largest the size of a marble. The intima about them is swollen and translucent; that of the arch is normal, with exception of patches of gelatinous swelling in neighbourhood of great vessels.

Brain.—Nothing of note about soft parts or calvaria; dura mater normal. On removal of organ, tissues at the base appear somewhat matted together, and there is a slight opacity and thickening of the membranes in front of the commissure, and along the longitudinal fissure. Over perforated spaces arachnoid is clear, but the pia mater is œdematous. Sylvian fissures opened with difficulty. No lymph at the base; arteries are full. On removing dura mater the cortex presents patches of lymph arranged somewhat symmetrically on the hemispheres, chiefly in neighbourhood of longitudinal fissure. Elongated patches exist on the 1st and 2nd frontal convolutions of left side, and another along the fissure of Rolando. On the right side, in the latter situation, is a much larger patch. About

them there is a good deal of gelatinous œdema of the membranes. Vessels of pia mater are full, the small ones over the convolutions very distinct. The sulci are broad and the membranes covering them œdematous. At posterior margin of corpus callosum and extending on to the upper surface of cerebellum is a thick layer of lymph. On slicing the organ, substance moist, of good consistence. Nothing special in the ventricles.

Remarks.—The occurrence of meningitis in pneumonia is, in the experience of English writers, a rare complication. Huguenin,¹ however, states that it is not uncommon in Zurich. A similar case to the present is reported in the Pathological Report for '77-'78. In both the inflammation was of the upper part of the right lung, and in both the patients had been subjected to depressing influences. It is a common experience here that apex pneumonia in debilitated persons is very often accompanied with delirium, usually of an active character. In the cases referred to it was more of the nature of deep stupor; no special head pain was complained of in either; and they bear out in this respect the diagnostic proposition laid down by Traube,² in commenting on a case very similar to the one here reported, that "in the course of pneumonia a meningitis may develop without headache, and which gives intimation of its presence only through deep stupor."

Huguenin deals with these secondary inflammations of the meninges under the term "metastatic," and suggests that in pneumonia "the puriform, broken-down material gets into the arterial current, is carried by it to the pia, and there sets up purulent inflammation." In the majority of cases, he states that the pneumonia was in the stage of purulent infiltration. In the instance here recorded the

1. Ziemssen's Encyclopedia. Bd. xii.

2. Gesammelte Beiträge. Bd. iii., 426. 1878.

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affected part of the lung was chiefly in the stage of red hepatization; in the other case referred to, entirely so. It may be that the meningitis was secondary to the ulcerative endocarditis, in which case its embolic origin is more intelligible.

For another and, perhaps, more plausible view of the nature of these secondary meningeal affections, see paper by Dr. Greenfield in St. Thomas's Hospital Reports, 1878.

4.—*Pneumonic Phthisis.*

George R., æt. 20, a negro; admitted to Hospital August 26th, with fever, cough and weakness. One sister died of consumption. Was tolerably well up to three weeks before his admission, when he got a severe wetting, since which time he has been feeling very ill. He did not "lay up," but attended as an out-door patient; there is no positive evidence of an attack of acute pneumonia of the ordinary type. During September he had high fever, night sweats, coughed a great deal, and rapidly emaciated. On the 1st of October, when he came under Dr. Ross's care, there were signs of a large cavity at the apex, while over the rest of the lung there were dulness and feeble blowing breathing. The fever persisted, and the prostration became more marked; death took place on October 19th from hæmoptysis.

Autopsy.—Nothing of special note in inspection of abdomen and thorax.

Lungs.—Left, pleura thickened; layers united at apex, covered with recent lymph in lateral region. Organ firm, solid and heavy, weighing 1,490 grams. On section a large cavity is exposed at the apex, containing clots and a reddish-yellow, very glutinous pus. The walls are exceedingly irregular, lined by rough, caseous masses, and crossed in spots by vessels and bronchi. No aneurismal dilatation on any of the vessels detected. The cavity occupies about

a third of the upper lobe. The rest of the organ is firm and airless, with the exception of a small margin at lower part. On section it presents a uniform, opaque-white colour; surface is dry, tissue breaks readily. Vessels and bronchi pervious, and about them there is a little gelatinous-looking tissue. On close inspection the individual air cells can be seen, but in most places very faintly. All parts present the same dry, cheesy appearance.

Right lung, weight 540 grams.; full in volume; crepitant, except at part of apex, which presents a small cavity surrounded by infiltrated, gelatinous-looking tissue. Tissue of middle lobe near root is in state of gelatinous oedema. Lower lobe contains several small caseous masses and a few firm nodular bodies like tubercles.

Bronchial glands enlarged, tumid, moderately pigmented, not caseous.

In ileum, glands of Peyer swollen, some as large as small peas.

Remarks.—This case is one which presents several points of great interest. I had never before met with exactly the same morbid appearance in the lungs, and the question at once arose, Is it a sequence of pneumonia, or is the process tuberculous? The entire illness lasted somewhat over two months, and began after a wetting, but not with the symptoms of ordinary pneumonia. When he entered the Hospital there was consolidation, with signs of breaking at the apex. The history is defective, and if the primary attack was pneumonic, it must have been subacute. A sister had died of phthisis, so that a family predisposition to pulmonary disease may be presumed. As to the condition of the left lung, the term caseous pneumonia best describes it. I have never seen such an extensive area of cheesy degeneration as presented by the lower lobe—uniform, solid, anæmic and dry; no trace of normal lung tissue (except narrow rim at border), and no nodules. In the extensive excavation of

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the upper lobe, the walls of the cavity are formed by breaking down cheesy substance. The microscopical examination shows the air cells occupied with a granular debris, mixed with cells in various stages of degeneration.

The whole appearance is what might be supposed to proceed from an unresolved pneumonia, which had gone on to caseation, and in the upper lobe to extensive softening.

The caseous areas which arise in connection with tuberculous phthisis are never, in my experience, so extensive, and do not involve a whole lobe in such a uniform manner. The disease in the right apex may have been secondary, or there may have been originally trouble at the apices.

5.—*Miners' Phthisis.*

J. T., æt. 60, native of Cornwall, admitted April 16th. Father, a miner, died at the age of 63, of consumption. Has worked in mines since the age of 14; in lead and tin until 15 years ago, when he came to America; and since then in copper, zinc and plumbago mines. Has enjoyed good health during the greater part of his life. Is a moderately temperate man. About three months ago noticed a slight cough, which has persisted ever since. He has failed gradually in health and strength, and has not been able to resume work.

April 18th.—Examined for the first time.

An elderly, moderately emaciated man; appears to prefer the sitting posture. Face and hands a little suffused, as if capillaries were over-full.

Chest.—On inspection right side somewhat sunken in front, and does not expand so freely as the left. On percussion, dulness for three fingers' breadth below right clavicle, clear over 3rd and 4th ribs, dulness again below, merging with that of the liver. Clear note at left apex in front and over both bases behind. On auscultation, cav-

erous breathing at right apex, with a loud click at end of inspiration. Expiration is prolonged, and accompanied by whistling râles at the left apex and at the bases. Breath sounds are feebler in left than in right scapular region. Expectoration viscid and glairy. Heart's impulse cannot be felt, dulness much diminished. Sounds normal. Pulse 90, feeble; temperature normal. Bowels regular; urine dark-coloured.

During the evening he sank rapidly, respirations became shorter, heart's action feeble, and he died about midnight.

Autopsy.—In abdomen, liver depressed, reaching nearly to the navel. In thorax, left lung extends over beyond the middle line; right lung universally adherent.

Heart.—Right ventricle dilated and hypertrophied; chamber measures from pulmonary ring to apex 15 cm.; wall, about middle, 7 m. in thickness. Left ventricle appears of normal size. Valves healthy. Weight of organ, 445 grams.

Lungs.—Moderately dark in colour. Left crepitant, except at one area behind. Pleura covering the lung uniformly dark, except at the posterior part of lower lobe, where it is thickened and of an opaque-white colour. Entire upper and anterior part of lower lobes emphysematous. A number of small firm spots can be felt, and these on section of the organ are seen to be dense fibroid areas, excessively pigmented. Except in these spots, and about the vessels and bronchi, the lung tissue is not of a dark, but rather of a slate-grey colour. Behind in an elongated area, extending through both lobes, measuring 18 by 6 cm. and 4.5 cm. in depth, the lung tissue is converted into a firm fibrous mass of inky blackness. On section it cuts with resistance, surface smooth, but in places there are small irregular spaces as if the tissue were breaking down. They contain dark-coloured fluid, but could not be traced in connection with bronchi.

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Right Lung.—Pleura very much thickened over antero-lateral regions. On section of the organ a cavity, the size of an orange, half-filled with purulent matter, is found at the apex, occupying chiefly the posterior part. The extreme apex and the entire anterior margin are composed of dense, firm, excessively pigmented fibrous tissue, which also surrounds the cavity in its lower and anterior parts. Middle lobe is emphysematous, lower lobe crepitant; on section numerous fibroid and pigmented areas as in other lung. At its anterior margin it is compressed by an encapsulated pleurisy. No caseous masses in either lung. Mucous membrane of bronchial tubes thickened; they contain a good deal of secretion. Bronchial glands pigmented and hard, none caseous. Nothing of special note in the other organs.

Remarks.—The cavities which form in the late stages of this disease appear to arise by the disintegration of the fibroid areas, as seen in the large fibrous mass at the back part of the left lung in this case. This is peculiar, as we usually regard the presence of this tissue in a diseased lung as conservative and protective. It may be that dilated bronchi play an important part in their production.

6.—*Note on the Occurrence of Membrane in the Trachea and Bronchi in Diphtheria.*

During the past three years, diphtheria of a severe type has been raging in this city. Thus, for the two years ending May 1st, 1879, 75 cases were admitted to Hospital, of which 34 died. It must be remembered that, as a rule, it is only the severe cases which are brought to Hospital, and a considerable number were sent in to have tracheotomy performed as a *dernier ressort*.

In 18 of the cases an inspection of the body was made. As to the situation of the membrane, in the great proportion both pharynx and larynx were involved; in three, no

laryngeal membrane; in one it was confined to larynx and trachea. (This case had come from a house in which other cases had occurred.) In one the membrane had cleared away; death having occurred suddenly on the thirteenth day. In one case, which recovered, the membrane extended over the entire mucosa of the mouth, involving the lips. In eight of the cases the membrane formed a continuous sheeting, extending down the trachea and into the bronchi, to the tubes of the 3rd and 4th degree. This is the point of greatest interest in connection with the series, and explains, to some extent, the high mortality. The membrane in the bronchi was not so firm as that in the trachea, and the tubes passing to the middle and lower lobes were, as a rule, more involved than those passing to the upper parts of the organ.

DIGESTIVE SYSTEM.

(a.)—*Gastro-Intestinal Canal.*

1.—*Foreign Body in Œsophagus—Ulceration—Perforation—Retro-pharyngeal and Œsophageal Abscess.*

Jane G., æt. 56, was brought to the Hospital in a dying condition, and, being friendless, no account could be obtained of the onset of the illness. During the 18 hours she was in hospital, she did not complain of any special difficulty in swallowing.

Autopsy, 24 hours after death.—Body that of a large, corpulent woman. Face and upper part of body swollen and emphysematous, and dependent parts very dark in colour.

In *abdomen*, signs of old peritonitis, particularly in pelvis. In *thorax*, tissues at upper part of anterior mediastinum infiltrated with pus, and a similar condition is seen about the structures at the root of the neck. Tongue, pharynx, œsophagus, and larynx removed together. The

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tissues in front of the spine from the base of the skull to a level with the bifurcation of the trachea are infiltrated with pus, and in a foul, sloughy state. It also extends laterally about the œsophagus and the sheaths of the great vessels of the neck, passing forward beneath the muscles. On slitting open the pharynx and œsophagus, a bone is seen imbedded in the anterior wall of the latter, immediately below the cricoid cartilage. It is a piece of mutton-chop bone, measuring 3 by 2 cm., and is firmly imbedded; the sharp end, towards the right, has perforated the mucous membrane only; the other end, the entire wall, which is ulcerated at this part.

At pyloric end of *stomach* are several minute losses of substance in the mucous membrane.

Nothing of note in the other organs.

2.—Three Cases of Cancer of Stomach.

(a.)—Diffuse Sub-mucous Cancer of Stomach—Small Patch of Ulceration—Perforation—Secondary Mass in Left Supra-renal Capsule.

Robt. C., æt. 43. History of failing health for months. Gastric symptoms not at all prominent. No tumour to be felt. Great emaciation. Death from peritonitis.

In *abdomen*, intestines dark and relaxed; six pints of dirty, offensive fluid removed. A few flakes of lymph on peritoneum; very little injection of the vessels. An oval perforation is seen in the anterior wall of the stomach, midway between the greater and lesser curvatures, and rather nearer the cardia than the pylorus.

Stomach small; orifices free; when laid open, mucous membrane of whole organ raised in tuberos nodules of irregular form, some small, others large, with broad bases. The largest are in the fundus and greater curve. On section, it is seen that the sub-mucous tissue between the

nodular masses is also involved over the greater part of the organ. On the anterior wall, about 4 cm. from the cardia, is a perforation the size of a three-penny bit. For 1 cm. about it the mucosa is ulcerated. No other spot of ulceration exists.

The left supra-renal capsule is enlarged, and partially involved in cancerous disease. About it also are several small firm nodules.

Nothing special in the other organs.

(b.)—*Cancer of Stomach—Extensive Ulceration of Anterior Wall—Left Lobe of Liver projecting into the Organ.*

Sarah W., æt. 43. Ill for six months with all the ordinary symptoms of cancer of stomach. Moderate emaciation. General œdema—slight in trunk.

In *abdomen*, parietal peritoneum adherent to omentum in epigastric region. About two quarts of turbid fluid removed. Omentum retracted and puckered. Left lobe of liver and stomach firmly united together. *Stomach* of average size. Orifices free. On slitting it open along the greater curvature, a large ulcerated surface is seen on the anterior wall and lesser curvature, nearer the pylorus than the cardia, and about the size of the palm of the hand in extent. On pouring water upon it, part of the left lobe of the liver is seen to project through the centre, while the peripheral parts are in a soft, sloughy state. The walls at the margins of the ulcer are infiltrated and thickened, but not to a very great extent.

No secondary masses in other organs.

(c.)—*Cancer of Stomach—Flattened Mass, not Ulcerated—Secondary Masses in Mesenteric Glands, Pancreas and Gall-bladder.*

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the Hospital March 14th. Ill for ten months. Gastric symptoms not marked. Great pain in epigastrium, in which region a prominent tumour could be felt. Jaundiced for some weeks before death, which took place ten days after admission.

Autopsy.—On opening abdomen, transverse colon crosses just above level of navel, and is full of hard feces; a great part of the tumour, evident externally, was due to this cause. There is a nodular mass outside the pyloric end of stomach, composed of enlarged glands. The head of the pancreas is large, and the mesentery forms a projecting mass, containing numerous cancerous glands, and is especially thick at the root and in region of the pancreas.

Stomach.—The pyloric zone for a distance of 5 cm. from the ring is firm, thickened, and the seat of cancerous disease. The orifice is a little contracted, admitting the index finger with difficulty. The disease occupies the lesser curve, and the anterior and posterior walls, leaving only a narrow portion, 2 cm. in breadth, unaffected. From the region of the lesser curve it projects into the duodenum for 1 cm. in the form of irregular fringes. The cancer is flat, with smooth, unulcerated surface, but here and there crossed by small fissures. On section it is seen to involve the entire mucous membrane, but the muscular coats are intact. The affected area forms a sort of flattened groove passing towards the pylorus, while the unaffected portion of mucosa forms a deeper and narrower channel, sharply bounded by the edges of the cancerous mass.

In hepatico-duodenal ligament, common bile duct is pervious, bile enters duodenum on pressing along its course. Portal vein is a good deal narrowed close to head of pancreas, by pressure of cancerous glands in this locality. All the tissues in the ligament are matted together, and close to the hilus of the liver there are several enlarged glands, which press upon the hepatic

ducts. The neck of the gall-bladder is involved in a secondary mass.

The *Pancreas* is enlarged, very firm and dense, and is the seat of secondary disease.

Liver presents several small nodules at posterior border.

Mesentery greatly enlarged, owing to the presence of numerous cancerous glands, some of which are as large as small apples. Some are undergoing caseous degeneration; others are firm and hard. Only a few have a true cancerous aspect.

3.—Three Cases of Ulcer of Stomach.

(a.)—Simple, Round Ulcer.

A. R., a well-developed man, patient of Dr. James Kerr, suffered for over a year with well-marked symptoms of ulcer of stomach. Several attacks of hæmatemesis; death occurred during one of them.

Stomach of average size. On lesser curvature a thickened mass can be felt, made up of indurated omental tissue and fat; beyond, in posterior wall, there is a slight puckering. When the organ is opened, this is found to correspond to an oval loss of substance, situated in the lesser curvature, 7 cm. from the pylorus, and extending more towards the posterior than the anterior wall. Its long diameter, which is at right angles to lesser curve, measures 2.8 cm., breadth 2 cm.; edges are rounded, cleanly cut, and formed by mucous membrane. They are undermined to a variable distance, 2–6 m. The ulcer is tolerably deep, the base made up of dense fibrous tissue, rough and irregular from the presence of bands, and the ends of obliterated, as well as open, vessels. These are very numerous, four presenting gaping orifices. On injecting water into the gastric artery, it flows in a full stream from the larger of the orifices. The base at the curvature is

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thick from the condensed tissue behind it, but on the posterior wall it is thin and translucent, and at this part the outline of a bifurcation of the gastric artery can be clearly seen.

The zone of pylorus, extending for 2.5 cm. about the ring but not involving it, is thickened by an hypertrophy of the muscular coats, in some spots 1 cm. in thickness. No affection of the mucosa.

Nothing of note in the other organs.

(b.)—*Multiple Ulcers (simple) at Cardiac End of Stomach—
Old Fibroid Tubercles in Lungs.*

D. M., æt 55. History of dyspepsia for three or four years; never hæmatemesis. Had had a cough for some months. Died somewhat suddenly during an attack, apparently, of congestion of the lungs.

Stomach.—Immediately below the cardiac orifice, on the posterior wall, is an ulcer 1.4 cm. in diameter; base fibroid, of a greyish-white colour; edges firm, not much elevated. Mucous membrane about it puckered. On peritoneal surface is a firm mass of fibroid tissue. In the fundus, towards the posterior wall, at a distance of 2 to 4 cm. from the large ulcer, are five smaller ones, the largest the size of a three-penny bit; edges firm, bases greyish-white, and peritoneal surface a little thickened. Mucous membrane in other parts of the organ healthy, but covered with a tenacious mucus. *Lungs.*—An excess of blood and serum in posterior parts. At apices there are fibroid areas, that in the left lung large and tissue about it much pigmented. No caseous masses. Throughout upper lobes numerous groups of firm miliary granulations, grey in colour, and very dense. They exist in groups of from 50–80, for the most part isolated, only a few had merged together. Not many in other lobes. Bronchial glands not enlarged. No caseous masses.

Examination of the ulcers gave no evidence of a tuberculous origin.

(c).—*Ulcer in Stomach—Fibroid Phthisis—Hypertrophied and Dilated Right Heart.*

Katherine H., æt. 39. History of cough for over 10 years; always worse during the winter. For the past three years has had occasional attacks of hæmoptysis. Admitted suffering from dyspnœa, with dropsy of legs and belly; enlarged liver and spleen.

At *Autopsy*, fibroid induration, with cavities, in upper half of both lungs; hypertrophy and dilatation of heart, particularly of right chambers. Amyloid liver and spleen.

Stomach, at cardiac end, presents elongated lines of hæmorrhagic infiltration of the mucous membrane. About the middle of the posterior wall is a yellow slough, 6 by 10 m., involving the mucous coat. Its surface is soft, and is on a slightly lower level than the surrounding mucosa. At the pylorus, close to the ring, there is an ulcer, 25 by 8 m., and extending to a depth of from 3 to 4 m., exposing the muscular coat. No plugged vessels could be traced in connection with either of these spots. Veins of the submucosa are much enlarged.

4.—*Three Cases of Simple Ulcer of Duodenum.*

(a).—W. B., æt. 40, patient of Dr. F. W. Campbell. Chief symptoms: vomiting, coming on very irregularly; attacks of pain; hæmorrhage from stomach and bowels. The condition was diagnosed; death took place from hæmorrhage.

Autopsy.—Moderate emaciation. In abdomen, stomach appears a little dilated; lower coils of small intestine dark-coloured. Nothing special in thorax.

Stomach somewhat dilated; walls of moderate thickness.

Case 28. Similar to Case preceding & duodenum 10 mm. from pylorus.

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Mucous membrane pale; at the cardiac end, thin. Pyloric orifice is narrowed, admitting the little finger to the 2nd joint. When slit open, there is no special thickening; but the mucosa is puckered, and presents an elevated ridge.

Duodenum.—Part immediately outside the ring much narrower than adjacent regions, measuring only 3·7 cm. About 10 m. from the pylorus there is an oval ulcer on the mucous membrane 2·5 by 1·8 cm., extending in direction of axis of gut, and occupying chiefly the posterior section of the tube. It is deep, with rounded edges, which, toward the upper and back part, are undermined for about 6 m. In places the floor of the ulcer is quite 6 or 7 m. below the level of the mucosa, and presents a tolerably smooth, fibrous appearance. The head of the pancreas forms the base of the lower three-fourths, the upper part is protected only by the thin muscular walls of the first piece of the duodenum, the peritoneal surface of which, at the site of the ulcer, is puckered and cicatricial. Immediately in the centre of the floor is a small, dark, blood-stained elevation, consisting chiefly of fibrin. On injecting water through the hepatic artery, small clots are washed out at this point, and the water flows freely into the ulcer through an opening in the gastro-epiploica dextra, 2 m. across, and with smooth edges. The papilla of the bile duct is 6 cm. below the ulcer. Nothing else of note in intestines.

(b.)—W. W., æt. 72, patient of Dr. Wilkins. Well-marked symptoms of ulcer, supposed to be gastric. Death took place slowly, after many months illness.

Autopsy.—Body much emaciated. In abdomen, peritoneum dull and lustreless; two pints of turbid fluid, mixed with lymph, removed. Stomach appears dilated.

Æsophagus presents in its terminal part an oval area, 3·5 by 1·2 cm., from which the mucous membrane has been

completely removed by the action of the gastric juice. In the centre a thin external layer alone remains. *Stomach* moderately dilated, and contains a dirty-looking, highly acid fluid. Mucous membrane pale; that of the fundus thin, owing to *post-mortem* solution. At the pyloric end it is thick, and presents numerous mammillations. The pylorus is greatly narrowed, admitting only the top of the little finger as far as the root of the nail. On slitting open the ring and the duodenum, the following condition is observed: pylorus not thickened; ring prominent, but not more so than is often seen. Immediately external to it is an irregular ulcer extending round the greater part of the circumference of the gut, and presenting an imperfect division into two portions, the larger of which occupies the lower part of the tube, resting upon the pancreas, the other being placed above and to the right. The extreme length of the ulcer is 3.7 cm., the breadth ranges from 6 to 13 m. The edges are round, and somewhat undermined. The base is formed of firm fibrous tissue, of a greyish-white colour. Close to the lower edge there is seen, on the floor, a small nodular body, looking like the end of a closed artery. The mucous membrane of the duodenum near the ulcer is greatly puckered, particularly the upper part. The bile papilla is about 5 cm. below the ulcer. Nothing of special note in the other organs beyond the atrophy of extreme emaciation.

★ (c.)—Mrs. R. S., æt. 48 years; a stout, well-nourished person.

The following notes have been furnished by Dr. Rodger, under whose care the patient was:—

"She had been married upwards of twenty-four years, but never had been pregnant; had always menstruated regularly, but had ceased about three years ago.

"The only illness of consequence that she ever had, was about fifteen years ago, when she was laid up in bed

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for about six weeks, with what was called an attack of inflammation of the liver. No jaundice was perceptible at that time. Ever since, however, she has been troubled with dyspepsia, obstinate constipation, and more or less pain or feeling of discomfort in the region of the stomach. Her condition to-day, March the 18th, 1879, is that of a person suffering from a well-marked attack of jaundice; skin and conjunctivæ deeply tinged; urine dark and stools pipe-clay in colour; tongue coated; loss of appetite; no increase of temperature. She states that she has not felt well all winter, but was always able to attend to her household duties.

"Patient came to my office for about four weeks; still, at the end of that time, symptoms had not improved.

"On April 24th, visited the patient at her house. Examination revealed no enlargement of the liver, and only slight tenderness on firm pressure over the organ. Heart and lungs healthy.

"Has noticed considerable blood at stool during the past few days, and faeces still pipe-clay in colour. No hæmorrhoids. Dr. G. W. Campbell saw the case in consultation, and gave a very unfavorable prognosis, though the exact nature of the disease was doubtful.

"All treatment adopted proved of no avail; the patient rapidly became emaciated, and continued deeply jaundiced. Several severe attacks of epistaxis have occurred lately, and to-day (May 30th) has passed more blood than usual by stool.

"At three p.m., May 31st, commenced vomiting blood, and continued to do so frequently all afternoon, in spite of treatment. The hæmorrhage from stomach and bowels became excessive, and death followed in a few minutes."

Autopsy.—Body that of a well-nourished, moderately stout woman. In abdomen, coils of intestines, dark-coloured, from staining of mucosa; peritoneal layer smooth. Liver dark-coloured; the ascending colon, the stomach and

duodenum are closely adherent to the under surface of its anterior margin. Nothing special in thorax. Stomach, duodenum, pancreas and liver removed together. *Stomach* dilated and contains dark-coloured clots and remnants of food; mucosa dark and blood-stained, otherwise unaltered. Pylorus normal. Immediately outside its well marked ring, in the upper and back part of the duodenum, is a large orifice 3.5 cm. in length, 1.5 cm. in breadth. It is partially blocked with clots, on the removal of which an oblong cavity is disclosed, occupying the under surface of the liver, in the position of the gall-bladder. The edges of the orifice are smooth and round, and the two fingers can be inserted into the cavity as far as the second joint. A good deal of thickening exists about the duodenum, where it is attached to the gall-bladder. Mucous membrane is not, however, puckered, and in the rest of its extent is normal. The following is the condition of the tissues in the hepatico-duodenal ligament:—Portal vein uninvolved, normal in size. Common bile duct pervious, and can be traced down to the upper margin of the ulcer, where it appears to open; at least, the probe-pointed scissors cut down freely and exposed the orifice at this situation, and it could not be further traced. It has probably been cut across by the ulcer. Walls are thickened. Branches in the liver normal. The cystic duct joins it by a small orifice, into which the probe can pass for 1.2 cm., and then meets with an obstruction on the wall of the sac. The hepatic artery when slit up is natural-looking; on following up the branches, a probe inserted into the main division of the right branch, which passes backwards and outwards, enters the upper end of the gall-bladder, and on slitting it open the wall is seen to be ulcerated through in a space 3 by 2 m., and the vessel communicates freely with the sac. The gall-bladder was then exposed, and is found in a condition of ulceration. Only towards the upper part is there any trace of mucous mem-

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brane ; in the rest of its extent the wall is rough, ulcerated, and, in places, sloughing. There is a deep prolongation towards the hilus of the liver, the tissue of which at this part is exposed and sloughing. It is here where the ulceration of the artery has taken place.

The ascending colon, close to the flexure, is adherent to the gall-bladder, and between the two there exists a circular orifice of communication, 7 m. in diameter, with rounded edges. There is no appearance about the ulcer or the gall-bladder to indicate a cancerous source of the disease.

Liver a little enlarged ; tissue very dark-coloured. A distinct triangular-shaped notch exists at the site of the gall-bladder, and the parts above are cicatricial. Scattered throughout the organ are numerous small isolated masses presenting the characteristics of secondary cancer ; one only is as large as a walnut. In looking for the primary disease, the parts about the right ovary are found matted, tore readily on removal, and appeared in a diseased condition. Only a very small bit could be surreptitiously removed, and this, unfortunately, did not give any clue to the nature of the disease about the ovary.

5.—*Typhoid Fever—Rapidly Fatal, with Nervous Symptoms.*

Ellen C., æt. 24 ; domestic servant. Was admitted to Hospital, under care of Dr. Ross, March 14th, at midnight. Illness began twenty-four hours before admission with chills and fever, followed by vomiting and purging. Employer states that she had not looked well for some days previous. When admitted she was delirious and in a state of extreme depression, resembling collapse. When spoken to, answers questions and then sinks again into a dull, heavy condition. Vomiting. Diarrhœa. Pupils equal and of normal size ; surface livid and cold ; pulse extremely small and weak, not very rapid, but can scarcely

be counted. Breathing shallow but regular. Every few minutes there are convulsive jerkings of the head and limbs. Does not complain of any pain. Temperature, 104° .

15th.—Unconscious all the day. Vomiting and purging continue. The limbs are in a semi-rigid state and resist flexion; jerkings not marked. Pupils dilated. Pulse extremely feeble. Temperature, 105° . She remained in this state until 11 p.m., when death took place, just 48 hours after onset of severe symptoms.

Autopsy, 12 hours after death. Body that of a small-sized, well-nourished woman. Nothing of special note in inspection of abdomen and thorax.

Heart normal; blood fluid.

Lungs crepitant; a good deal of blood in dependent parts.

Spleen somewhat enlarged, weighs 185 grams.; pulp, soft and dark-coloured.

Nothing abnormal in stomach. Duodenum and jejunum contain yellow, semi-fluid, contents; mucous membrane healthy. Lower half of ileum presents the following appearance: Bowel not very vascular, submucous vessels moderately full; capillaries of mucosa not injected. Solitary glands are enlarged and prominent; many are as large as split peas and of an opaque white colour. Peyer's patches are enlarged and swollen; five or six upper ones, from 3 to 5 cm. in length, are greyish-white in colour. Surfaces unbroken or only pitted in one or two spots. Five patches, within a foot of the valve, are in a more advanced state; the largest, 6 cm. in length, has an irregular cribriform surface, the pits reddened, the margins and unruptured follicles greyish-white. The others are not so open. Very little swelling or injection of the mucosa about the patches. Mesenteric glands very little, if at all, swollen. Large bowel normal.

In *Brain*.—Vessels of pia mater full; nothing special in the substance.

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6.—*Perforation of Appendix Vermiformis—Circumscribed Abscess—Perforation of Ileum—Hæmorrhage from Bowels.*

A. B., æt. 45 (under care of Dr. A. A. Browne). In February, 1878, had a severe "bilious attack," lasting about three weeks, and from which he got quite well. On April 24th, 1879, had another attack, chief symptoms being severe vomiting, flatulence, constipation, and a thickly-furred, moist, brown tongue. The attack yielded to ordinary remedies, and by May 24th, the tongue was clean, the appetite much improved and the bowels acting better, although the stools were still very clay-coloured and offensive. The flatulence continued, although not so distressing, and the belly remained considerably distended. There was no pain on pressure over the distended bowels at any time or at any point. From this time (24th) his symptoms became aggravated; that is, the flatulence was more distressing and the bowels became loose, with yeasty, clay-coloured, very offensive motions. He now began to lose flesh very rapidly. Symptoms continued much the same up to morning of the 9th of June, when, about 8 o'clock, he passed a large quantity of blood in bed; it was florid, mixed with dark clots, and loose fecal matter. He complained of pain in lower part of belly. At 12.30 he lost again a still larger quantity and sank rapidly, dying at 4 p.m. the same day.

Autopsy, 24 hours after death. Body that of a large, well-nourished man; no signs of *post-mortem* decomposition; belly greatly distended.

In making preliminary incision a coil of intestine was accidentally wounded, and a quantity of very fœtid gas escaped. Small intestine is enormously distended and very dark-coloured; the coils are as large as the thick part of an average sized forearm. This condition exists in all parts, with the exception of the first few inches of the

jejunum, and the terminal part of the ileum. There is no fluid in peritoneum, nor is the membrane inflamed. On tracing down the coils of bowel, they can be followed for four or five feet, and then the lower ones, in the neighbourhood of upper part of pelvis, become matted together, so that it is impossible to separate them without tearing. Lying upon the promontory of the sacrum, and extending towards the right side, is a flattened purulent sac, the size of the palm of the hand, and to this the coils of the ileum and the mesentery are closely adherent. On dissection the following condition was discovered:—Cæcum and large bowel normal. Appendix vermiformis is long, passes horizontally out and is firmly attached to the purulent sac, with which it communicates by two openings. When slit open, the mucous membrane of the outer third is rough and in places denuded, while at the extreme apex are the two round perforations. This part of the appendix is very closely united to the wall of the sac. Several coils of the ileum are in close union with the sac, and when slit open two perforations are seen. In the neighbourhood of these are several ulcers on the mucosa. The intestinal wall is so softened that the dissection without tearing was impossible. The mesentery is also firmly united on the upper wall of the sac, and one of the vessels in it is plugged with a firm thrombus. The origin of the fatal hæmorrhage was not discovered.

(b.) *Liver.*

7.—*Hydatid Cyst.*

The specimen was found in the liver of a subject in the Class of Operative Surgery during the Summer Session. Patient, a tramp, had been admitted to the Hospital with Pneumonia, of which he died. No information could be obtained from him as to his past history; so that it is not

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known how long he had been a resident in the country. The cyst occupies the posterior part of the right lobe of the organ, and is in close contact with the diaphragm. On removal, it measures 10 by 8 cm., and is about the size of a large orange. The following parts appear on dissection :—

(1.) The external cyst-wall, intimately adherent to the liver substance. It is firm, dense and fibrous, in some places of cartilaginous consistence, and here and there covered with soft cretaceous matter.

(2.) Lining this is the internal capsule or proper sac; a translucent membrane, 1·5 m. in diameter, easily torn, in places bile-tinged, and on the inner surface presenting a finely granular appearance.

(3.) Within this are four or five secondary or daughter cysts with exceedingly delicate membranes, so that they burst on being turned out, and gave exit to a quantity of jelly-like fluid; and numerous smaller grand-daughter cysts of all sizes, from a pea to a large walnut. In colour they are opaque white or perfectly translucent. All are partially collapsed. On examination some of the cysts contain only granular matter; others, the majority, contain innumerable hydatid heads. These are free in the fluid of the cysts. No brood-capsules met with. In some of the larger cysts, a fourth generation is seen in the form of small bead-like projections from the lining membrane, ranging in size from a pin's head to a pea; some are pedunculated, others free. They consist of a laminated sheath, enclosing a dark granular mass.

Remarks.—Hydatid disease is very uncommon in this country. I believe one case occurred in the General Hospital some years ago; and Mr. Mignault read a paper, at a recent meeting of the McGill Medical Society, on a case of hydatids of the liver, which he met with last summer in the Eastern Townships. These are the only examples of the disease in this country with which I am acquainted.

I do not think that any case has been recorded in the Journals. In my helminthological studies, I have examined some scores of dogs, and have not yet found a specimen of the *Tenia echinococcus*.

8.—*Primary Cancer.*

A. H., æt. 54. Patient of Dr. Drake's. A temperate man, of spare habits. History of dyspepsia for over two years. Up to eight weeks before his death was able to attend to his work as usual. Since this time he has been laid up—the chief symptoms being pain, enlargement of the liver, gastric disturbance, and rapid emaciation. During the last week of life, jaundice supervened.

Autopsy.—Liver could be felt as a firm, hard structure, nearly a hand's breadth below the costal margin.

On opening *Abdomen*, nothing special observed beyond the enlargement of this organ.

In *Thorax*, moderate effusion in right pleura.

Heart, small.

Lungs—Cheesy masses and small cavities at apices, together with much fibroid tissue. Firm miliary granulations in neighbouring lung tissue.

Liver much enlarged; weight 3,000 grams.; normal shape retained. Adhesions, recent and old, to diaphragm. Upper surface smooth, but presents many flattened and rounded eminences of a yellowish-white colour or mottled with red. They project but slightly, and only two of them present shallow depressions. The masses range in size from a pea to a large walnut. On the under surface the masses are not so numerous.

On making a section through the organ the greater part of the substance appears occupied by the cancerous masses, the limits of which are often ill-defined, blending with the bile-stained liver tissue. In addition to the usual areas of an opaque white colour, with vascular

borders, there are others of a pale-brown hue, particularly numerous on the under surface of the organ. There is no single large mass, but all parts of the organ appear equally involved.

Tissues in hepatico-duodenal ligament thickened. Glands a little enlarged. Vein in its primary branches compressed; right branch only admits the top of the little finger.

Stomach—Mucous membrane much mammillated, especially at the pylorus, where the little fissures separating the mammillae are unusually deep. The membrane is tough, tearing with difficulty.

Spleen, pancreas, and kidneys, normal. Nothing of note in large or small intestine. No other cancer found, after careful search in all organs of the body, except the brain, an examination of which was not allowed.

9.—*Cirrhosis of Liver—Collateral Circulation by Means of an Enlarged Umbilical Vein—Death from Pneumonia.*

Body that of a small, but well-nourished woman. So far as could be ascertained, she had never suffered from ascites or any symptoms of cirrhosis.

On opening abdomen a large tortuous vein is seen, passing from the liver in the round ligament to the umbilicus, where it is continuous with the deep epigastric veins of the left side. It does not communicate with the superficial epigastric vessels, but unites at once with the deep, the two main branches of which, on the left side, are greatly enlarged and can be traced down beneath the peritoneum to the internal iliac, where they open by a single vessel, which also receives branches from the wall of the pelvis and the bladder.

Veins of left ovary and in broad ligament of this side are much enlarged; right, not to the same extent. Inferior

cava is increased in size, and measures 5.5 cm. across, just above the renals.

Liver weighs 1,755 grams., and is very irregular in shape. Capsule is smooth but opaque. There are no superficial granulations as in the "hob-nailed" organ, but the surface is mapped out into large hemispherical areas, separated by shallow grooves. On the under side there is considerable deformity from the projection of a large mass, half the size of the left lobe, and apparently formed by the lobus Spigelii and lobus caudatus.

On section the increase of the fibroid tissue is chiefly in the sheath of Glisson, large areas of the liver substance being compressed, and but very little excess of connective tissue between small groups of lobules, as in the ordinary form of cirrhosis. In the hepatico-duodenal ligament, bile duct is pervious; hepatic artery is natural. Portal vein admits index finger; when slit open its branches in the liver are found considerably contracted, the largest going to the right lobe only admits an ordinary sized lead-pencil. Passing off from the portal, towards the anterior border, is the large vein described above, as running in the round ligament to the umbilicus. At its origin it admits the tip of the little finger.

Inferior cava, where it passes through the liver, admits three fingers.

Upper and middle lobes of right lung in state of purulent infiltration.

Kidneys moderately fibroid. Left ventricle hypertrophied.

10.—*Pylephlebitis.*

J. P., æt. 26, a commercial traveller, patient of Dr. F. W. Campbell, who has kindly furnished the following notes:—Had been ill for several weeks in July with an attack of inflammation of the cæcum, and in August,

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when he returned to Montreal, he was weak and much emaciated. On August 9th, tongue white, abdomen much distended, with clear percussion note over every part except transverse and upper part of descending colon. Complaints of shooting pains, which are relieved by passing wind. Has no appetite, feels sick at stomach, and occasionally vomits. Under nitro-muriatic acid and pepsin mixture, with poultices to belly, he improved somewhat, but early in September the symptoms returned, the pain became more severe, and there were acid eructations. Continued to get weaker and more emaciated in spite of very active supporting treatment. In the end of September he appeared somewhat better, and was able to sit up each day for an hour or so. On the morning of the 10th of October he was found dead in bed.

Autopsy.—Body much emaciated. No jaundice. External abdominal veins not enlarged. On opening abdomen, entire peritoneum of a deep slate-colour, and covered in spots with soft, easily removable flakes of lymph. About 6 oz. of turbid serum in pelvis, and at bottom of this cavity a little more than an ounce of pus. On carefully inspecting the coils of intestines from the duodenum downwards, the central part of jejunum appears specially dark, and the portion of mesentery corresponding to this is much swollen and fluctuates. All the coils are relaxed and of a very peculiar colour. Signs of past peritonitis in the form of old bridles in neighbourhood of ascending colon. On pelvic peritoneum, a little to the right of the centre of the lower third of rectum, is a small superficial slough, the size of a sixpenny bit; the base grey and stringy, the tissue about it discoloured and a little hæmorrhagic. It is situated in the part of the pelvis where the pus had lodged. No inflamed veins can be traced in connection with it. Stomach, liver, mesentery and portion of jejunum removed together. Mucous membrane of

stomach pale, and presents on anterior wall two or three round swellings, the largest the size of a small walnut; and from this one, on pressure, pus oozes at a small orifice. In duodenum, bile flows from the duct on pressing the gall-bladder. Throughout the small intestine the mucosa is sodden, dark in colour, blood vessels not distinct; no ulceration. In caecum, orifice of *appendix* is obliterated. It is firmly adherent and presents on its upper surface a small superficial slough involving the peritoneal and muscular coats. Tissue in neighbourhood injected, but no great amount of lymph. On slitting up the tube, mucous membrane dark, not ulcerated; no perforation at the slough. Caecal end obliterated for 6 m. No suppurating vein could be traced in connection with the slough. The *mesentery* in its whole extent is thickened and infiltrated, and in the central part has a boggy, fluctuating feel. In places it is covered with flakes of lymph. When cut into a large quantity of creamy, inodorous pus escaped, and was thought to come from a mesenteric abscess. On squeezing the membrane, however, the pus is seen to ooze from several points, and on inserting the probe-pointed scissors and slitting in the direction indicated, distinct channels are found, which can be followed towards the root and also towards the intestinal border. In the former direction they connect with the mesenteric vein; in the later it was not possible to determine accurately how they ended, most of them apparently by blind extremities at the intestinal border. They communicate freely with each other, forming a series of elongated cavities filled with pus. No mesenteric vessels filled with blood can be seen. A few lymphatic glands noticed; none suppurating. On tracing up the mesenteric vein, the suppuration extends into the portal and gastric veins. The splenic vein is closed at its junction with the gastric. The trunk of the latter contained pus, and its branches passing from the greater curvature along the anterior

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1.—*Extent of Spots*

A. B. S chest and pneumonia. *Kidneys* mottled. appearance

wall are much dilated and tortuous—the swelling on the mucosa being in connection with them. The walls of the *portal vein* are thickened and matted with the surrounding tissues. It contains a quantity of creamy pus, and the internal lining when washed has a rough, shreddy appearance. It is somewhat narrowed at the commencement, but widens as it passes up.

On slitting open the main branches in the liver they are found dilated, full of pus, walls greyish-yellow in colour, and presenting here and there bits of sloughing membrane. On every section of the organ suppurating veins are seen, from which pus flows freely; they often look like local abscesses, but in every instance they could be traced in connection with branches of the portal vein. The vessels of the right lobe were more dilated than those of the left. Hepatic artery and its branches are normal. Hepatic duct pervious; its branches in the liver contain bile. Liver itself not much, if at all, enlarged; substance of a deep brown colour, in places almost black. The tissue in immediate contact with the suppurating veins, for from 1 to 2 m., is of a yellowish-grey colour, and sharply limited from the rest of the substance.

URINARY SYSTEM.

Kidneys.

1.—Extensive Scald of Thorax — Pneumonia — Numerous Spots of Fatty Degeneration in Kidneys.

A. B. Severely scalded in upper half of front of the chest and in front of shoulders and arms. Death from pneumonia of right lung.

Kidneys, enlarged; capsules detach easily. Surface mottled. On section they present a very peculiar appearance. Scattered through cortices and medullæ are

numerous small isolated areas, yellowish-white in colour, and contrasting strongly with the tissue about them. They are about 2 m. in diameter and are solitary, not running in lines. They are equally abundant in both organs. On examination they appear to be localized spots of fatty degeneration affecting limited areas in the tubules; the epithelium is in places distinct, in others obscured by the amount of molecular fat and oil drops. The tissue in immediate neighbourhood is not altered, and nothing abnormal could be detected in the blood vessels.

2.—*Small Contracted Kidneys—Left Organ affected to an unusual degree—Right only involved in the lower part—Hypertrophy of Heart.*

Ann T., æt. 40; a washerwoman. Admitted January 4th, under Dr. Ross. Five years ago suffered with pains in limbs and severe headache, with a pemphigoid eruption, probably syphilitic. Has enjoyed fair health until last September, when, after exposure to cold, she had a febrile attack, followed by general dropsy, headache, pains in back, bloody urine with casts. Remained in Hospital six weeks, and was discharged much improved. When re-admitted, at above date, had general dropsy, anæmia, cough, dyspnœa, headache, and pain over cardia. Urine scanty, 16 to 20 oz.; low sp. gr., 1,003; contains 40 per cent of albumen. A few granular casts. Heart enlarged; systolic murmur at apex. Patient improved rapidly under digitalis.

Jan. 21st.—Worse again. Urine diminished in amount. Condition varied from day to day, severity of the symptoms being in inverse ratio to amount of urine and of urea eliminated. Variations in 10 days, 24th to February 4th:—Urine, 24 to 64 oz.; urea, 94 to 167 grains. Towards end of February effusion took place into both pleuræ. Cough

and dyspnoea, and general oedema.

Autopsy.—The lungs were well-nourished, and the face of the face.

In the thoracic cavity.

Kidneys.—The natural colour of the kidneys was diminished, and the surface was covered with peels of fatty degeneration. The natural colour of the face was between the natural and the pathological, and the face was far from natural. The organs of the chest were pale, and the pyramids of the kidneys were only a natural looking; the distinguishing features of the and standard artery fine. Weight of

Left Kidney.—It is composed of 2-4 m. in the kidney spots not shrunken, off readily.

Heart.—The heart was enlarged, and the aortic ring was middle part of the Aorta pro-

and dyspnoea increased. Patient gradually lost consciousness, and died on the 2nd of March.

Autopsy.—Body that of an average sized, moderately well-nourished woman. Oedema of legs; slight puffiness of face.

In *thorax*, about a pint of clear serum in each pleural cavity.

Kidneys.—Right much mis-shapen, consisting of a large, natural looking, upper segment, still lobulated, and a diminutive, greatly shrunken lower portion. Capsule peels off easily; surface of upper part is smooth and natural looking; that of the atrophied portion is darker in colour, finely granular, and in places puckered. Limit between these two regions very sharply defined, extending farther up on the anterior than the posterior side. Organ cuts firmly; tissue of upper part normal, but pale, vasa recta alone visible. Vessels at bases of pyramids distinct. In the lower atrophied region there is only a narrow zone of cortex, very granular and coarse looking; pyramids small, flattened, in places scarcely distinguishable. The small arteries have very thick walls and stand out prominently between the two areas. Renal artery firm; walls thick. Pelvis and ureters normal. Weight of organ, 75 grams.

Left Kidney, not so large as a testicle; weight, 20 grams. It is composed almost entirely of a thin cortical region 2-4 m. in thickness, and scarcely distinguishable as kidney substance. Pyramids very much flattened, in spots not recognizable. Pelvis and ureter small and shrunken, but pervious. Capsule thick and dense; peels off readily, leaving an excessively granular surface.

Heart enlarged, due chiefly to hypertrophy of left ventricle. Valves healthy. Left ventricle, 10 cm. from aortic ring to apex; circumference, 14 cm. Anterior wall, middle part, 2 cm. in thickness.

Aorta presents numerous atheromatous patches. Small

arteries of the body—mesenteric, splenic, gastric and radial, moderately stiff.

Lungs cedematous in posterior parts.

3.—*Large Cirrhotic Kidneys (Congested)—Hypertrophy of Heart—Apoplexy.*

Susan G., æt. 40. Admitted under Dr. Ross, March 10th, with right facial paralysis of three weeks duration. Complains of weakness, short breath, and violent action of the heart. Is anæmic; superficial arteries firm and tortuous. Heart large; impulse strong. Apex beat indistinct; no murmur. First sound distant; second strong, sharp, and loud. Urine about 40 oz. per diem; contains 20 to 30 per cent. of albumen. Bowels loose. Symptoms did not vary until the 15th, 2 A.M., when she was suddenly seized with right hemiplegia, became comatose and died in two hours. There was constant tossing of the left arm and leg during the attack.

Autopsy.—Body that of a well-nourished woman; no dropsy. Nothing of note on inspection of thorax or abdomen.

Kidneys.—Left, organ of full volume, but long and narrow. Capsule detaches without difficulty, exposing an irregular, coarsely granular surface of a deep red colour. On close inspection, small white areas are seen on the projecting portions of the surface. On section, organ firm; substance deeply congested. Pyramids somewhat darker than the cortex, which in places is thin, but for the most part looks of normal thickness. At bases of pyramids are numerous prominent arteries, large and small. Tissue of cortex is coarse, and on examination with a lens the medullary rays can be faintly seen as opaque lines in the deep red back-ground, running up from the cones. Malpighian bodies not visible. Calices and infundibula are large; ureter normal. Right kidney a little smaller, and

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presents precisely the same appearance. No cysts in either. Renal arteries stiff and large; left measures, at its central part, 10 by 7 m.

Heart much enlarged. Considerable amount of blood in right chambers. Right ventricle large; columnæ carneæ much developed, causing great increase in the thickness of the walls (7-8 m). Tricuspid orifice dilated; heart cone 15 cm. in circumference passes freely through. Septum bulges a good deal towards this side. Left ventricle dilated; measures 9.5 cm. from aortic ring to apex, circumference 16 cm.. Contains only one small clot. Walls very thick; anterior, close to septum, 3 cm.; septum, 2 cm.; near apex, 1.8 cm. Muscle substance of good colour, but coarse looking. Valves normal. Coronary arteries a little stiff; no degeneration of intima. Arch of aorta healthy looking; button-like masses of atheroma in thoracic and abdominal portions, and some opaque white areas of fatty degeneration. Smaller arteries moderately firm.

Brain presents a large extravasation in the left hemisphere outside the ventricle, involving the anterior limit of the internal capsule, the anterior part of lenticular nucleus, and the white substance between these parts and the convolutions of the central lobe. The caudate nucleus is not much affected, but is pushed forward and to the right.

4.—*Sarcoma of Left Kidney.*

A. B., æt. 47. Had suffered for over two years with symptoms of renal disease, the hæmorrhage being one of the most marked. In May, 1877, he passed a remarkably long blood cast of the ureter. About a year after the appearance of the first symptoms a tumour developed in the left side, and grew slowly and painlessly, while his strength and flesh progressively decreased. A remarkable feature of the case was the entire absence of pain, and up

to within ten days of his death the digestion remained good.

Autopsy.—Body that of an average sized, greatly emaciated man. On inspection, left side of abdomen presents a considerable enlargement, firm, immovable, and resistant to the touch. On opening the cavity, peritoneum smooth, no exudation; viscera are pushed aside by a large tumour which occupies the hypochondriac and lumbar regions of the left side, and extends to the left beyond the middle line. The diaphragm is pushed up by the tumour to a level with the 4th rib on the left side, while below, the mass is in contact with the spine of the ilium. Smooth, glistening peritoneum covers it in front, the transverse colon crosses it obliquely about the upper third, and near the middle the pancreas is stretched across it to the duodenum. At the upper end the spleen is closely adherent.

The tumour readily turns out, not having any very firm attachments. It is oval in shape, measuring 71 cm. in length, 60 in transverse circumference. Weight, 5400 grms. (12 lbs). Lower end is pointed; upper end more obtuse. Numerous superficial veins cross it in all directions beneath the peritoneum. Anteriorly it is smooth and round, mapped out by superficial furrows into irregular masses of a greyish-white colour. Posteriorly, and a little to the right, there is a deep groove corresponding to the point of attachment to the spine. At the lower end of the mass the tissue looks of a reddish-brown colour; here, on section, there is a thin layer of renal substance, nowhere more than 2 to 4 m. in thickness, and in immediate continuity with the soft medullary tissue of the tumour. At the inner border, close to the groove, for the spine, are the aorta and inferior cava. The former is closely connected with the growth, and gives off a slightly enlarged renal artery, and two smaller branches, all of which penetrate the mass. The inferior vena cava is of

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normal size up to the point where the renal vein enters. About 4 cm. above the iliacs, a vein, the size of the little finger, enters from the kidney and is distended with a greyish-white thrombus which projects half way across the lumen of the cava. The renal vein is of enormous size, measuring 10.5 cm. in circumference, and can be traced for 12 cm. along the inner border of the tumour, receiving three branches in its course. All of these veins, with the exception of one entering from the adrenal, are distended with thrombi, greyish-white in colour; in the renal vein the thrombus is not adherent to the walls, but in close apposition. In the branches they are adherent. The thrombus projects from the vein into the inferior cava, up which it passes for a distance of 8 cm., nearly to the entrance of the hepatic veins. Here, also, it is loosely adherent, and a space exists along which the blood could readily pass; the cava is in this part a good deal dilated, measuring 8.5 cm. in circumference. The thrombus ends in a tapering, rough, bifid extremity, attached to which are some shreds of fibrin. Passing down from the tumour along the side of the left iliac vein for some distance, is a distended tube filled with soft material; this, probably, represents the ureter, but, unfortunately, its prolongation towards the bladder was not traced. On the posterior surface of the mass, there is a large convoluted vein filled with a soft, greyish thrombus, and several smaller ones are to be seen at the left border, in the same condition. At the upper and anterior part of the tumour is the suprarenal capsule, greatly stretched and flattened, measuring 12 by 3 cm. It is easily separated; its vein is free and empties into the renal. One retro-peritoneal gland in the neighbourhood of the aorta is enlarged and soft, but none of the other abdominal lymph glands are affected.

On microscopical examination, the softer portions of the tumour are found to be made up of large irregular cells, with distinct nuclei. Many of these are exceptionally

large, somewhat flattened, and with one or two central nuclei. In sections, the softer parts appear made up entirely of closely packed cells with very little stroma; but in the peripheral firmer parts a fibro-nucleated stroma occurs, in which the cells are imbedded, but there is no constant alveolar arrangement.

The *Pancreas* is elongated and flattened.

Right Kidney of full size; tissue a little coarse looking. Bladder normal.

Lungs present posteriorly numerous small secondary nodules, ranging in size from a pea to a marble, chiefly in lower lobes. Spleen natural looking. Liver has one secondary nodule the size of a walnut at the posterior border.

GENERATIVE SYSTEM.

1.—*Dermoid of Ovary—Ulcerative Colitis.*

B. F., æt. 44. Admitted November 11th with profuse diarrhœa, and died on the following day.

Autopsy.—Body that of an average sized, moderately well-nourished woman. On opening abdomen a conical shaped tumour is seen projecting from, and entirely filling, the pelvis, reaching nearly to the navel. The apex of the tumour projects to the left. No adhesions; no fluid in peritoneal sac. Uterus, ovaries, and tumour removed together, when it is seen that the latter is connected with uterus by a narrow, somewhat twisted stalk 4 cm. long, representing the Fallopian tube of this side, while the tumour corresponds to the ovary. It is about the size of an infant's head, ovoid in shape, smooth externally, and free from adhesions. To the touch it is soft and doughy, but on firm pressure a harder mass can be felt in the centre. On section a quantity of dirty-looking, semi-diffluent matter escaped, mixed with long hairs. In the

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centre there is a firm mass the size of the fist, greyish-white in colour, of the consistence of putty, and consisting of inspissated sebum, intermingled with hairs. On removal of this and after washing out the cyst, the lining wall appears rough and covered with scales, looking like a bit of ichthyotic skin. The part near the attachment of the tumour is thicker and more fleshy, and here numerous long dark-brown hairs are attached, some 35 cm. in length. Where the long hairs are absent, there are numerous small pubescent ones. Corresponding to the insertion of the stalk there is a strawberry-like projection of the cyst wall, indented with orifices of sebaceous follicles; immediately above this a bicuspid tooth is inserted, with well developed crown, neck, and fang, the latter inserted into the cyst wall for 5 m. Close to it, beneath the lining membrane, there is a flattened piece of bone, irregular in shape, notched, and dentated, measuring about 10 m. in each direction. Fallopian tube can be traced up to the base of the tumour, at which part it is coiled. Uterus and opposite ovary normal.

Cæcum and *Colon* present innumerable small ulcers.

2.—*Cancer of Neck of Uterus—Constriction of Right Ureter—Pyonephrosis.*

Mary B., æt. 40, ill for more than a year with well-marked symptoms of cancer at neck of uterus. For more than four years had suffered on and off with hæmorrhage from the uterus; and this has been a prominent symptom through her illness. No special symptoms referable to kidneys.

Autopsy.—Body much emaciated.

In abdomen, small quantity of sero-purulent fluid. On drawing the small intestines aside, the right kidney is seen to be enormously enlarged, extending from high up beneath the liver to below the crest of the ilium. In

pelvis, uterus is in position; there is thickening about the broad ligament of the right side.

Right kidney, uterus, bladder, and rectum removed together. On dissection, rectum is closely adherent to vagina and neck of uterus; mucosa normal. On slitting up vagina, the upper zone is rough and ulcerated, the posterior wall being deficient in one spot. The lips of the uterus are gone and the walls of the cervix are puckered, dense, and roughened. A narrow orifice communicates with the cavity of the uterus, the mucous membrane of which is dark-coloured but intact. The disease is entirely confined to the cervical region and upper part of the vagina, and consists chiefly of fibroid induration, the softer portions having disappeared in the ulceration.

Behind and to the left side of the uterus is a sac filled with pus, about the size of a small apple. It occupies the broad ligament and extends almost to the vagina. The Fallopian tube and ovary of this side cannot be seen, having apparently been involved in the formation of this sac. When laid open the walls are rough, sloughy, and crossed here and there by fibrous trabeculae. There is no communication with the uterus or with the disease at the neck.

Right Kidney forms a large fluctuating tumour, irregularly sacculated, and when cut into nearly 30 oz. of thick pus escaped. The whole organ is composed of a number of sacculi, communicating with the pelvis; some of them are as large as an orange. The walls are thin, 1 to 2 m., and covered internally by a rough, greyish membrane. The capsule of the organ is thickened, but strips off easily, leaving a dark surface, which still retains some appearance of kidney substance. Pelvis is moderately dilated, in proportion to the kidney; the ureter communicates with it by a narrow orifice, 10 m. in circumference, beyond which the tube is dilated, and in the body was

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as large as the thumb. Walls are thick, mucosa pale; not ulcerated. On tracing it down it retains its large size to within 12 m. of the bladder, where it appears to terminate in a blind extremity; but at the bottom of this apparent *cul-de-sac* there is a small orifice through which a bristle can be passed into the bladder, the narrow canal being about 16 m. in length. The constriction of the ureter at this part has resulted from its involvement in the contraction of the fibroid tissues about the neck of the womb.

Left Kidney is normal; its pelvis and infundibula are slightly enlarged. *Ureter* is a little narrowed near the uterus.

3.—*Ruptured Follicle in Right Ovary—Peritonitis.*

E. L., æt. 28. Admitted March 11th, with general peritonitis. Illness began on Saturday, the 8th, with a chill and pain in the abdomen. Continued at work, but on Sunday was much worse; pain very severe, particularly on right side. She had menstruated three weeks before the commencement of the attack. When sent to Hospital on Tuesday, there were all the symptoms of general peritonitis, to which she succumbed early on the morning of the 13th.

Autopsy.—Body that of a well-nourished, healthy looking woman. Abdomen distended, and when opened, intestines found matted together with recent lymph and peritoneum moderately injected. Inflammation most intense about the pelvic organs and specially in region of right ovary. More than a pint of sero-purulent fluid removed.

Right Ovary 4.5 cm. in length, almost entirely covered with a layer of greenish lymph, which can be peeled off as a continuous membrane, exposing a discoloured, inflamed-looking surface. Close to the outer end, on the

anterior surface, is a ruptured follicle with a blood clot hanging from it. The orifice is round, 2 m. across with thin, dark-coloured edges. The follicle is about the size of a large pea, lining membrane distinct, somewhat dark-coloured, but in one or two spots has a decidedly yellow tinge. A reddish-black clot, 7 by 5 m., projects from it, being attached to the upper edge of the margin. The surface of the ovary surrounding the orifice is dark-coloured and a little roughened, and the same condition is seen upon the convex border of the organ. On section numerous Graafian follicles are seen in all stages of development, together with small cicatrices of corpora lutea.

Left Ovary smaller, 4 cm. long; surface discoloured but smooth, not covered with lymph. On section two corpora lutea seen; largest 5 by 7 m. Wall slightly convoluted and pigmented; centre, fibroid.

Uterus—Length, 6.5 cm.; of cavity, 5 cm. Peritoneal surface of a dirty-green colour, and covered with flakes of lymph. Organ soft; muscular walls of normal thickness. In cavity, mucous membrane of upper three-fourths covered with a bloody mucus, after the removal of which a thin deep-red mucosa is exposed. This exudation on the surface is composed of innumerable cylindrical epithelial cells—cilia ill-defined—leucocytes and a moderate number of red corpuscles. With these are fibrin fibrils and molecular fat, and occasional shreds of tissue made up of elongated cells. Teased bits of the mucosa show uterine glands, presenting nothing abnormal, and numerous blood corpuscles.

Broad ligament and Fallopian tube on right side, covered with lymph; not so much on left side.

Viscera of thorax present nothing abnormal.

Abdominal viscera carefully inspected with a view of finding cause for the peritoneal inflammation. Stomach and intestines healthy.

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Remarks.—Reference is made in obstetrical works to the possibility of the occurrence of peritonitis after rupture of a Graafian follicle, but I have not been able to find anything definite on the subject. The connection in this case would seem clear—in the absence of any of the well recognized causes of peritonitis, and considering the fact that the intensity of the inflammation was about the right ovary.

It appears, moreover, to have been an ordinary ripe follicle which had ruptured, but somewhat prematurely, as she had menstruated three weeks before the attack. The blood in the uterine cavity was probably not menstrual in the true sense. The history of the beginning of the attack and of the antecedent circumstances are imperfect, and there may have been constitutional or sexual disturbances of which we know nothing, but which may have had considerable influence in bringing about the inflammation.

4.—*Extra Uterine (Abdominal) Pregnancy.*

S. A., æt. 35, patient of Dr. Kennedy's, was admitted under Dr. Ross on November 18th. Had expected her confinement (second child) about the middle of October. On July 24th fetal movements were distinctly felt. Early in August she stated that she thought the child must be dead, as its movements had ceased, and on examination they could not be felt. From the beginning of September she began to fail in health, got thin, and had chills followed by fever. The uterus was examined, and found to be healthy. When admitted, she was pale, emaciated, and febrile. Abdomen is smooth, prominent, and somewhat tense; the lower zone projects, but no definite tumour can be felt. On the right side, low down, there is fulness and hardness and great tenderness. She has severe rigors, followed by profuse sweating. On the

12th she had two greyish, very foetid stools, containing some macerated foetal bones, a tibia and three ribs. The next day she passed a temporal bone. No aperture could be felt on digital examination of the rectum. The condition of the woman precluded any idea of operative interference. She remained in this state until the 30th, when death occurred.

Autopsy.—Body greatly emaciated. On opening the abdomen, peritoneal layers below the navel closely matted together. After separation a tumour is seen, extending from the pelvis as high as the transverse colon, to which it is attached; while laterally it encroaches on the inguinal regions. The tumour is about the size of a child's head; anterior walls flaccid, and when cut into a large quantity of material, looking like a mixture of ashes and water, escaped. In this are the bones of a foetus, completely denuded of soft parts, and much blackened. All are disarticulated and those of the head separated. The walls of the sac are from 2 to 4 m. in thickness; the lining membrane is dark-grey in colour, in some places quite black. Behind the uterus the cavity extends as low as the neck, and on the right side are several sinuses passing into the tissues between the sac and the rectum. On the right side the sac is firmly adherent to the coils of the ileum; and in one or two places ulceration has almost caused perforation of the thin wall between them. A little to the left of the upper part of the sac is an oval orifice of communication with the sigmoid flexure, about 2 cm. in length; edges rounded and dark in colour. In broad ligament of right side there is a cyst, the size of an apple, filled with material similar to that in the main sac, with which it is in communication by a valvular orifice. The Fallopian tube on this side terminates in the upper part of the cyst wall in a blind, somewhat dilated, extremity. Ovary of this side was not found. Tissues of broad ligament in both sides thickened and indurated; and in

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the right, below the smaller sac mentioned above, there are lines of suppuration running towards the os uteri, and some of the veins in this situation contain thrombi.

Uterus is enlarged, 12 cm. in length. Mucous membrane soft, not hypertrophied.

5.—*Cryptorchidismus.*

R. M., æt. 38; a strongly-built machinist. Admitted with strangulated inguinal hernia of right side, which was operated upon, death following in a few hours.

On opening abdomen, omentum is injected and attached in right inguinal canal. A few ounces of dirty semi-feculent fluid in peritoneal cavity. A few flakes of lymph are seen on coils of ileum. The bowel has been nipped, just three feet from the valve, and immediately above the constriction there is a tiny perforation.

Right inguinal canal is large, admitting two fingers, and leads to a large scrotal sac.

On examination it is seen that the patient has been the subject of undescended testes; the right organ lies just at the internal ring, the left high up on the postero-lateral wall of the pelvis. Both organs are very small, not larger than good-sized almonds. They were removed with the vasa deferentia, prostrate, and bladder. On dissection the epididymis of each organ is small and separated by a considerable interval from the body of the testis, the vasa efferentia being very distinct. On section the substance of the organs is soft, yellowish in colour, and teased preparations show that there is an entire absence of secreting structures; the seminal tubules can be uncoiled, but they are filled with granular debris and fat. No trace of seminal vesicles or epithelium.

The vasa deferentia are small and cord-like; the lumina very fine. Vesiculæ seminales are of a normal size, and from some of the tubes a fluid resembling semen can

be squeezed; but when examined it is found to be composed of epithelial cells. No spermatozoa. In some of the larger coils there is a firm inspissated matter, like wax. Prostate is normal.

Left inguinal canal admits the index finger, and leads down to the upper part of the scrotum, forming a short peritoneal pouch.

Nothing abnormal about the other organs.

LYMPHATIC SYSTEM.

1.—*Medullary Sarcoma of Axillary Glands—Secondary Masses in Heart, Lungs, Stomach, Intestines, Liver, Spleen, Kidneys, Supra-Renal Capsules, and Pancreas.*

P. B., æt. 45; for two and a half months had noticed the rapid growth of a tumour in right axillary region. Had lost 30 lbs. in weight. Great œdema of right arm. Liver enlarged and tender. Left upper eyelid paralysed and left pupil dilated. All the ocular muscles of this side are paralysed. Optic disc and retina normal.

Autopsy.—Body that of a medium-sized, tolerably well-nourished man. Right arm and hand much swollen and œdematous, fully double the size of the limb on the left side.

In the right axillary region is a large tumour, involving also the shoulder and all parts about the head of the humerus. The largest mass fills up the axilla, being moulded upon the chest, convex externally; above it reaches the clavicle, below the level of the 7th rib. Anteriorly it extends below the clavicle to within two inches of the sternum, while lower down it reaches the mammary line, almost touching the nipple; posteriorly it fills the subscapular fossa, infiltrating and destroying the muscles in this region. The axillary vessels pass directly through the mass; the artery is narrowed, but the probe passes freely. The vein pursues a sinuous

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course, and in places is almost obliterated by the projection into its lumen of nodular masses. It is not ulcerated at any part. The cords of the brachial plexus are compressed, but not infiltrated. The deltoid muscle, where it passes over the head of the humerus, is much thinned; its lower part is infiltrated and destroyed. Immediately beneath the acromion process, and to the outer and back part of the head of the humerus, is a large rounded projection, which elevates and involves the terminal portions of the infra-spinatus and teres minor. The neck of the scapula is eroded and the articular surface almost separated from the body of the bone. The coracoid process and upper border are involved, the growth passing through the bone and infiltrating the supra-spinatus. The articular surface of the humerus is covered by peculiarly dry, leathery tissue, not unlike the fibrinous laminæ of an old aneurism. The ligaments are all involved and the bone eroded at the margin of the articular surface, which is itself intact.

On section of the large mass beneath the pectoral muscles and in the axilla, it presents an indistinctly lobular appearance; the surface tolerably firm, greyish-white in colour, interspersed with blood-red areas of either extravasation or congestion.

Heart presents nothing unusual beyond a secondary mass, the size of a cherry, in the anterior wall of the left ventricle.

Lungs.—Throughout both organs are numerous firm nodules, ranging in size from a pea to a marble. On section, whitish in colour not very vascular.

Bronchial glands very large, and on the left side a mass the size of a billiard ball exists at the root of the lung.

Spleen enlarged, 320 grams. Four masses, the size of large walnuts, project from the convex border. One, the smallest, is cupped. On section they are reddish-white in colour, hæmorrhagic in centre.

Kidneys enlarged, lobulated. Substance thickly studded with secondary masses, some as large as marbles. The majority of them have an opaque-white appearance; others are dark-red, or even black.

Supra-renal bodies enlarged and extensively infiltrated. *Pancreas* presents several secondary masses.

Liver weighs 3,970 grams., and is uniformly enlarged; surface smooth, no nodular masses, but on section there is seen a diffuse infiltration of extensive areas, not sharply defined, but blending with normal looking substance.

Stomach.—On the mucous membrane of fundus there is a flat elevated mass, beginning to ulcerate on the surface.

Intestines.—About twenty small ulcers are seen throughout jejunum and ileum, nearly half of them being in the upper part of the bowel. They range in size from a three-penny bit to a sixpence, or a little larger; edges much elevated, bases cupped and covered with a greyish-yellow material, beneath which is a firm translucent matrix involving the coats of the bowel to the depth of 3-4 m. In the cæcum are eight or ten ulcers presenting similar characters.

The *Brain* itself presents nothing abnormal, but the pituitary body in the sella turcica is enlarged and soft, and a tolerably firm extension from it passes into the left cavernous sinus, surrounding all the parts in this situation, the whole forming a firm immovable mass. The 3rd nerve runs along the top of the mass and was dissected off without much difficulty, appearing somewhat compressed. The 4th is imbedded in the upper part; the 5th passes to the outer side, and is not involved; the 6th is on the under surface, and in part of its extent is surrounded by the tissue of the mass. The artery is not compressed.

The histological notes of this case have unfortunately been mislaid. Both primary and secondary masses pre-

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sented the characters of medullary sarcoma, the cells being large and round, the stroma variable in amount in different localities and not presenting a distinctly alveolar arrangement. The occurrence of secondary ulcerating masses in the stomach and intestines is a point of interest in the case, on account of the rarity with which these organs are attacked in secondary disease.

2.—*Sarcoma of Retro-Peritoneal Glands—Lobstein Cancer.*

J. S. Male child (patient of Dr. Gardner), æt. 3; the subject of an abdominal tumour, which had been growing rapidly for about three months. Position central. Rapid emaciation. Belly greatly distended.

On opening the abdomen a large tumour is seen to occupy almost the entire cavity, the intestines being pushed into the pelvis. At the upper end it is closely adherent to the under surface of the liver. It lies entirely behind the peritoneum. In front the ascending colon crosses diagonally; the cæcum is pushed up to the level of the navel, and the ileum runs along the lower third to join it. A little to the left of the median line is the inferior cava, pervious in its whole length, but empty; the aorta lay a little further to the left at the side of the mass. The tumour is easily turned, having no adhesions except to the right kidney, which is partially imbedded in it. Weight estimated at about 12 lbs. It is soft, and with an elastic, semi-fluctuating feel. It is enclosed in a thin capsule, and in front and at the sides by the peritoneum; posteriorly it is in immediate contact with the vertebral column and lower ribs, the 11th on the right side being slightly eroded. A section made through the mass revealed a soft cerebriform tissue, white in colour, interspersed here and there with vascular and hæmorrhagic spots. At the posterior part extensive hæmorrhage has taken place into the growth, and the tissue here is blood-stained and

mingled with clots. The mass is uniform throughout; not lobulated, and does not present signs of degeneration.

The *Right Kidney* is much flattened, and the upper and anterior part is involved in the growth. The ureter passed through the mass and was partially compressed, the upper part and the pelvis of the kidney being dilated in consequence.

No secondary masses.

Microscopic appearances are those of a rapidly growing lymphoma, composed of small, closely packed lymph corpuscles.

3.—*Lympho-sarcoma of Deep Cervical Glands, involving the Thyroid and simulating Göttr.*

M. D., æt. 16; an average sized, but feebly-developed girl. Had been under treatment for three weeks for what appeared to be an ordinary bronchocele. She stated that she had not noticed it before, and it had grown rapidly while under observation.

On the evening of the 14th of October she became restless and had considerable difficulty in breathing, so much so that a consultation was held as to the propriety of performing tracheotomy. She became easier and the operation was deferred. Later on in the evening she got up and walked about, and, according to the statements of the attendants, died suddenly.

Autopsy, 18 hours after death.

Lips a little bluish; face pale; no lividity. A large round mass occupies the front of the neck in the situation of the thyroid body, extending to the left and projecting to a level with the chin. Skin over it is tense and the surface has a leaden hue.

Heart.—Right chambers moderately full, not distended. Tricuspid orifice large for the size of the organ. Left chambers contain small amount of fluid blood and clots;

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ventricle not flaccid. Valves normal. About 10 oz. of blood and clots escaped from the heart and vessels in the preliminary incisions, and in the removal of the organ.

Lungs crepitant throughout, and contain a good deal of blood in dependent parts.

Arch of aorta, vessels, and nerves of the neck, with the tumour, larynx, trachea, and pharynx removed together. The mass turns out easily, but extends deeply into the neck beneath the muscles on the left side, which are stretched over it.

Tonsils and glands at base of tongue swollen and of an opaque white colour. *Œsophagus* considerably compressed, the little finger just passes at the narrowest portion. On slitting it open, mucous membrane normal. *Glottis* natural looking. *Trachea* pushed to the right and considerably flattened in the antero-posterior direction by the pressure of the enlarged left lobe of the thyroid. It admits the little finger, so that there is no very great stenosis; but it may have been greater before the incision on the skin was relieved.

On examining the tumour from the front, the growth is seen to involve almost exclusively the left lobe of the thyroid, in the situation of which there is a large round mass 20 cm. in circumference, which extends above to the level of the thyro-hyoid ligament, and below passes down beside the trachea to the bifurcation. In a groove on the outer side of the mass, the left carotid artery and pneumogastric nerve are deeply imbedded; both are stretched, but not otherwise affected. From behind, the mass is elongated and of a somewhat oval shape. It lies along the whole length of the left side of the trachea, the lower end resting on the left bronchus. Along this surface it measures 12 cm. in length, 5 cm. in breadth. The *œsophagus* lies between this somewhat flattened posterior surface and the spine.

The right lobe of the thyroid is of normal size and

appearance. At the upper and right angle of the mass in front, there is a small thin remnant of the left lobe, capping the tumour in the situation; the tissues of the two blending together, not separated by a capsule. The mass is of a greyish-white colour externally, and on section the external parts are moderately firm; centre soft, like softening brain matter. The whole is interspersed with vascular spots. Left pneumogastric nerve is stretched, but not otherwise involved.

Teased bits from any portion of the tumour show numerous small lymphoid corpuscles, which, with a small amount of delicate connective tissue, make up the chief histological elements of the growth. In the part corresponding to the left lobe of the thyroid there are strands of fibrous tissue, but, except at the extreme upper part of the lobe, there is no trace of the proper gland substance.

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ON THE

SYSTOLIC BRAIN MURMUR

OF

CHILDREN.

BY

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ON THE
SYSTOLIC BRAIN MURMUR OF CHILDREN.

BY WILLIAM OSLER, M. D., M. R. C. P. LOND.,
Professor of the Institutes of Medicine, McGill University, Montreal.

I DESIRE in the following communication to call attention to this interesting clinical phenomenon, first described by Dr. J. Fisher, of Boston, in the *Medical Magazine* for 1833. Like many other observations, this one has suffered from the lapse of time, and has been, to a great extent, forgotten and neglected. In conversation with many physicians, some of them specially connected with pediatrics, I have been surprised to find how few were even aware of the existence of such a murmur. Very cursory mention is made of it in works on auscultation and, with a few exceptions, those on diseases of children. Up to 1863 the German and French physicians had written many papers on the subject, and within the past few years interest has been re-aroused in it by the publication of important memoirs by Jurasz¹ and Epstein.² English and American physicians have not given it much attention, and in the literature as collected by Jurasz the only references are Whitney, the *American Journal Medical Sciences*, 1843, and J. W. Smith, the *Lancet*, 1839.

In the autumn of 1876, I was asked by a medical friend to see a child, aged three years, with a remarkable murmur in the head, about which the parents

¹ Das systolische Hirngeräusch der Kinder. Heidelberg. 1877.

² Beitrag zur Kenntniss des systolischen Schädelgeräusches der Kinder. Prag. 1878.

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were very anxious. The child was a well-nourished little girl, with a ruddy complexion, well-formed head, fontanelles closed; no evidences of rickets. On placing the ear upon any part of the head a loud, high-pitched systolic murmur could be heard, variable in intensity, loudest in the temporal regions, also audible in the carotids, and disappearing entirely on compression of these vessels. There was no heart disease. The mother had noticed the noise in the head, she thought, from the time the child was a year old, and the child also appeared conscious of its presence, but said she only heard it at intervals. The medical attendant had suggested the possibility of aneurism, but there did not seem to me to be any evidence in favor of such a view. I had a distinct recollection of the fact that a murmur was described as occurring in the brains of children, but I thought it was always audible over an open fontanelle, and partaking of the nature of a venous hum, originating in the longitudinal sinus. As the child was in good health, and the murmur had persisted for nearly two years, I gave a favorable prognosis. The mother did not appear satisfied, but I heard nothing further of the case for some months, when I recognized it in the description of a Case of Supposed Gummy Tumor of the Brain, in which the murmur was attributed to the possible existence of a syphilitic growth pressing upon the vessels at the base of the brain. About the same time Jurasz's memoir came to hand, and renewed my interest in the case, which has proved to be one of unusual value from the length of time which the murmur has continued. The history of the child from the spring of 1877 to the present is as follows: she has thriven, and is now a bright, intelligent little girl of seven, perfectly healthy, head not enlarged, and no trace of swollen lymphatic glands in the neck. I have examined her on four occasions, and found the murmur persistent, with the same characteristics. On the 15th of May of the present year I examined her again, and found it still very

distinct, loudest in the temporal regions, rather more variable in intensity than hitherto, and sometimes disappearing entirely for a few moments. It was with difficulty heard in the carotids.

I have examined about sixty children for this murmur, and have discovered it in eight cases, all under three years of age: one, a case of chronic hydrocephalus; one, chronic intestinal catarrh with rickets; the others appeared healthy. Among the sick children examined in whom no murmur existed were several cases of rickets, two of tuberculous meningitis, and one of chronic hydrocephalus. Dr. James Bell, late house surgeon of the Montreal General Hospital, examined one hundred children, and found only six instances of the "brain murmur;" but, as he remarked, the difficulty of detecting a soft, low-pitched *bruit* in the head of a struggling child in a busy, "out-door" room makes it probable that in many instances it was overlooked. No special note was kept in these cases of the condition of the children.

Observers differ very much in their estimation of the import of this murmur, some regarding it as pathological, others as physiological. Dr. Fisher thought it to be the former, and described variations of the murmur in such diseases as whooping-cough, congestion of the brain, acute and chronic hydrocephalus, and apoplexy. Barthez and Rilliet (1853) thought that it afforded a diagnostic sign between rachitic hypertrophy of the brain and chronic hydrocephalus. Roger (1859) and Henoch (1861) regarded it as specially connected with rickets. Wirthgen (1855), on the other hand, believed it to be physiological, and states that it is heard most frequently over the heads of robust children. The views of these and other writers are given very fully in Jurasz's monograph, and the discordance of opinion is amply illustrated. This author concludes that it is not pathological, but occurs in both healthy and diseased children, and does not stand in direct connection with any particular disease. In reading over the rec-

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ords of cases it is certainly noteworthy how frequent the subject of the murmur is described as rickety.

There is remarkable unanimity among all the writers as to the age at which the murmur prevails, the extremes in the recorded cases being the third month and the sixth year, the majority of instances occurring during the second year. The case of the little girl above given is of interest, therefore, in this connection, as she is now over seven years of age, and further from the fact of the persistence of the murmur since infancy. I have not found any recorded instance of the murmur persisting for such a length of time.

The seat of the production of the murmur is placed by most authors in the arteries at the base of the brain and in the carotid canal. Hennig believed it to be venous, and produced in the longitudinal sinus. It is worthy of note that in the majority of the cases a murmur is also heard in the carotid arteries.

Jurasz has brought forward evidence to prove that the murmur originates in the carotid canal, and as his explanation of it has not, so far as I know, been published in any English or American journal, it may be worth while to give a summary of his views: He measured the width of the upper and lower orifices of the carotid canal in twenty-five adults and twenty-five new-born infants. In the former the inferior aperture varied from 6.4 m. to 1 cm. in the long, and 5.4 to 7.6 m. in the short diameter; the superior aperture from 5.4 to 8 m. in the longest, and 5.3 to 7.4 m. in the shortest diameter. Measurements in the mature fetus and new-born when compared with these show a difference of from 4.1 to 6.2 m. for the long, and 3.7 to 4.6 m. for the short diameter of the inferior aperture, and 3.1 to 4.3 m. for the long, and 3.3 to 3.9 m. for the short diameter of the superior aperture. The carotid canal must therefore enlarge considerably in the course of development. Does this take place gradually, or does it occur more rapidly at one period than another? His observations and measurements go to show that up

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to the sixth month the canal does not enlarge, remaining unchanged; but from this date it widens rapidly, so that from the third to the sixth year the dimensions of the adult canal are attained. The enlargement is held to be due to the increase in volume of the carotid artery, and not to an independent growth, that is, expansion, of the bone; and this being the case it is not impossible that a temporary local disproportion ensues between the rapidly enlarging carotid artery and the surrounding bony wall, or, "in other words, a temporary stenosis of the carotid takes place in the carotid canal." This physiological stenosis is held to be the cause of the systolic brain murmur, which is to be regarded as a normal occurrence. It is the expression of a struggle between the artery and its bony investment, which persists until by the pressure of the pulsations the canal has been widened to a suitable degree.

Epstein¹ criticises this theory and the anatomical data on which it is based, denying the rapid expansion of the carotid canal after the sixth month and its enlargement by the pulsation of the artery. Taking the following circumstances as favoring the production of vascular murmurs, namely, wide vessels, rapid blood flow, diminished peripheral resistance, elasticity, and thinness of the walls, he proceeds to show that these prevail to an unusual degree in infancy, particularly in the vessels of the head, which, according to Beneke, are relatively larger than the others of the body. In children, also, the arterial walls are thinner, the capillaries wider, the blood flow more rapid, and consequently the blood pressure is low. The existence of such conditions, especially in anæmic children, is regarded as the predisposing, if not the exciting, cause of the brain murmur. He calls attention to a fact of great importance in this connection: in two cases there were found, *post mortem*, enlarged and hard lymph glands in the course of the carotid arteries, and in all children examined subsequently, in whom the murmur was heard, the presence of en-

¹ Loc. cit.

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larged glands in this situation was determined. He suggests that the murmur may be due to this cause.

So far as my limited experience goes, I am not inclined to regard the murmur as of any special pathological significance. There can be no doubt, however, from the numerous observations of French and German physicians, that it occurs most frequently in weak, rickety children, but its presence and persistence in perfectly healthy infants are sufficient to disprove the peculiar connection which some have supposed it to have with this disease. Thus I have had a strong, well-developed child under observation since birth; the murmur appeared at the fourth month, and has now continued for twenty-two months, with little or no change. Though not prepared to criticise Jurasz's ingenious view, not having entered into the anatomical question, I think that the cases of the little girl above mentioned, in whom the murmur has lasted for six years, and the infant in which I have followed it for twenty-two months, are strongly opposed, if not fatal, to any such theory. If the carotid canal is widened by the pulsation of the artery, it is scarcely conceivable that a *physiological stenosis* could persist for six years.

I have not been able to detect any special enlargement in the cervical glands along the carotids in the cases which have come under observation since receiving Epstein's pamphlet. In one case there were two enlarged and firm glands behind the sterno-mastoid muscle on the right side. Unless the enlargement is considerable, it is difficult to feel the deep glands along the carotids, particularly if the child is well nourished. Epstein's suggestion is, however, worthy of further investigation.

CASES OF INSULAR SCLEROSIS.

By WM. OSLER, M.D., M.R.C.P., LOND.

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(Read before the Medical-Chirurgical Society of Montreal.)

GENTLEMEN: I wish to bring under your notice this evening a form of Cerebro-Spinal Disease which has not yet engaged the attention of the Society, and of which, so far as I know, no cases have been reported in this country. It is characterized pathologically by the presence of numerous small spots of hardening, or sclerosis, throughout the brain and cord—hence the names insular, disseminated, multiple—and clinically by a variable yet well marked group of symptoms, among which a peculiar trembling of the limbs, motor pareses and an affection of the speech are the most prominent.

CASE I.—F. H., æt. 26, was sent to me for examination by Dr. Donald Baynes, on Nov. 21st, 1877. Patient is a tall, fair man, moderately well developed. Attention is at once directed to a peculiar trembling motion of the head and arms, and it is about this that he wishes advice. The following is the result of examination:—*Motion*—When perfectly at rest and the attention withdrawn from his condition, there are no movements, and nothing special is noticeable about the young man. When, however, the arms are lifted, the peculiar trembling begins, slight at first, then increasing somewhat; in the case

of the right arm the movement is fully a foot in extent, shaking to and fro and causing a motion in the thorax, which is communicated more or less to the entire body. The left arm does not move so energetically, and can be more readily controlled; the shaking of the hand is well marked, and consists in a series of rapid, short, partial, acts of pronation and supination. When the arm is placed at rest the motion ceases, quickly if laid naturally in the lap, more slowly if laid upon the table or a book. Whenever a voluntary effort is made with the arms the peculiar movements begin, and become so active that it is only with great difficulty and after several attempts that he can pick up his hat. At the first part of the examination the arms showed a slight tremulousness even when at rest, but this was apparently due to nervousness, as afterwards it completely disappeared.

In the upright position there is a slight to and fro oscillation of the head, and when walking there is a nodding motion, which gives him a very odd appearance. At rest on a pillow there is no movement. There is very slight trembling noticed in the legs when held out; the act of walking is unaffected. The muscles appear well developed, the grasp of the hand is firm, and motor power generally is retained. Dr. Baynes states that the electrical excitability of the muscles—faradic and galvanic—is present.

The *voice* is peculiar, the utterance being slow, and the words brought out with distinctness and with the appearance of slight effort. He states that he does not experience any difficulty in speaking, but has noticed for some months past that the voice has altered, and the words do not follow each other so smoothly. Muscles of tongue and lips appear healthy; no fibrillar tremors.

Sensation is intact; no abnormal sensations in affected limbs. The tendon reflex well marked, but not excessive. Organs of special sense are normal. Psychological functions intact. No headache at any time. No symptoms referable to thoracic or abdominal viscera. Has been short of breath for the past two months. General health is excellent; appetite good; sleeps well.

By a happy coincidence I had Engesser's article (in *Ziemssen's Archiv*, Bd. XVII) on Multiple Sclerosis before me when the patient came in, and the symptoms presented by him corresponded so closely with the description I had just read, that the diagnosis seemed very clear.

The following is the family and personal history: Father and mother dead; had not had any nervous disease. A sister suffers from nervous prostration, and has "attacks," during which she cannot talk. Other brothers (3) and sisters (5) are healthy. Has been engaged in mercantile occupation since 15th year. About five years ago, when in the employ of a West Indian firm in London, the troubles began with difficulty in writing, owing to an inability to hold the pen properly. From the account which he gives the attack seemed very like writer's cramp. It did not, however, prevent him from writing with the right hand for many months, but at last he had to discontinue, and then learnt to write with the left hand, which at this time shook very slightly, and could be steadied by effort. Wrote with this hand for about eight months, and then had to give up on account of the constant oscillation. At this time he could still cut up meat and feed himself, but for the past year the movements have become so increased on attempting any action, and it is only with the greatest effort that the simplest duty can be performed. A glass of water lifted to the mouth is certain to be spilt, and on attempting to take a spoonful of soup or lift a bit of meat on a fork to the mouth, the irregularity of the movement is such that the food is much more likely to reach either ear. It is only within the past year that the movements of the head have come on.

CASE II.—James Bennet, aged 44, an average-sized, dark-complexioned man, was admitted to the General Hospital under my care in May of this year, complaining of inability to walk and a trembling movement of the arms. He has a somewhat dull look, but answers questions intelligently. The following symptoms are presented: When sitting at ease the muscles of the hands are seen to twitch, particularly those of the left, and when the arms are extended, as in the attempt to perform any voluntary action, a shaking tremor begins, consisting in a

series of to and fro oscillations, the excursions in the right arm being slight, in the left very considerable, sufficient to cause slight movement of the trunk. The tremor is not very rhythmic, but is sufficiently characteristic. In the left hand he can hardly hold a cup, but almost involuntarily assists with the right. If asked to try to restrain the movement it becomes much worse. The tremor ceases when the arms are at rest, and the muscular twitchings diminish greatly when his attention is withdrawn for some time to other matters. The grip with either hand is strong. Faradic excitability of the muscles normal. There is no to and fro movement of the head. The legs are well nourished, and when held out shake irregularly, but the oscillations are neither so fine nor so regular as in the upper extremities. Patient can barely stand alone, but does so readily if assisted, and can then walk across the ward. If encouraged he tries to do so alone, and can walk several yards. The gait is peculiar: the legs are abducted and wide apart, the knees slightly flexed, the trunk thrown a little forward. The feet keep close to the floor, but the toes are lifted, and the heels appear to touch the floor first. Does not look at the feet. Can not stand with eyes shut. Great difficulty is experienced in rising up and sitting down, and also in turning round. The legs shake a good deal in making the steps.

When tongue is protruded it shakes *en masse*, and also presents fibrillar tremors. Slight tremor of lips and muscles of expression when in action—none when at rest. The reflexes are exaggerated, the "knee tap" phenomenon being well marked, and the ankle clonus readily obtained. Skin reflexes not exaggerated. No disturbances of *sensation*.

The *voice* is peculiar; the first words of a sentence are clearly, though slowly, pronounced, the conclusion is usually indistinct, at times unintelligible, from the running together of the words. The speech altogether has a thick, blurred character, reminding one strongly of that of a drunken man.

The act of swallowing is well performed. Eyes look normal; there is no nystagmus; pupils medium sized, active. Sense of smell good—can distinguish snuff from pepper. Has no head-

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ache or pains; sleeps well; eats well. Intelligence appears impaired, but his conversation is quite rational. Has been impotent for about a year and a half. Functions of rectum and bladder normally performed. Examination of abdominal and thoracic viscera negative. Temperature 98°.

The history, as far as can be ascertained, is as follows: Worked 18 years in the gas-works, latterly as a carter; has been very industrious, and had amassed a little property. Has been married 21 years, and has seven children; has been a very healthy man; has taken alcoholic liquors freely, but never "lost a day" by drink. Seven years ago had sores; no history of any secondary affections. In April, 1878, his troubles began with business difficulties in a building society, whereby he lost his property. This worried him greatly, and, as his wife says, "he was not the same after." On the 24th of May he was arrested for stealing a jacket from a yard which he was cleaning, and was sent to jail for a month. After being discharged he began to act queerly, carting other people's bricks and dumping them on the road, stealing little things, and making bird-cages, which he could never finish. Was rather dull, moping and despondent. Never appears to have had delusions of grandeur or wealth. In July he was arrested for taking some boards, and was sent to jail, and from thence to the asylum as insane, where he remained for nine months, and was discharged as cured. The precise nature of his insanity is doubtful, but he certainly had no somatic troubles. Through the summer of 1879 was able to do a little work. Difficulty in walking began about this time; was on one occasion collared by a policeman as drunk, and thereby roused to a state of great excitement. The tremor of arms came on gradually, and was well marked on Feb. 20th, 1880, when he applied at the Dispensary, and was treated by Dr. Macdonnell. The affection of the speech developed during the winter, subsequent to the tremor of the limbs.

CASE III.—For permission to use this I am indebted to Dr. Reddy, under whose care the patient came.

S. B., æt. 45, admitted June 11th. No satisfactory history could be obtained, as from the time of admission he

was unable to talk, and the person who brought him from Valleyfield did not know anything of him. During the few days in Hospital he presented the following symptoms: Paresis of all extremities, chiefly those of left side. Impairment of tactile and painful impressions. Marked contracture of left arm. No tremors. Ptosis of right eye. Incontinence of urine and faeces. He was very weak and emaciated when admitted, and died in five days.

Autopsy, four hours after death.—Body that of a tall, thin man. Nothing special to be noted on superficial inspection. Limbs flaccid and of equal size.

Calvaria unusually thick and dense. In dura mater, Pacchionian bodies very large. Sinuses contain clots. In removal of organ much clear serum escaped. Arachnoid over sulci and at base is opaque. Convolutions look somewhat wasted. Arteries at base, stiff and studded over with numerous opaque spots of atheroma. The walls of internal carotids and the vertebrals are more uniformly involved. The first part of the basilar looks a little dilated. The superficial branches of the arteries can be distinctly traced upon the convolutions by the small yellowish-white beads of atheroma upon them. Organ then carefully sliced, according to the method of M. Pitres. The substance cuts with remarkable firmness and a certain degree of resistance. *Præfrontal section*—On the right side there is a patch of altered tissue, 7×4 m., situated in the white matter of the third convolution. It is greyish in colour, firm, surface a little depressed, edges not well defined. With a hand lens the texture looks fibrous. No other spots found on cutting up this slice.

Pediculo-frontal section.—On the left side there is a patch the size of a small pea, in the white substance just above the caudate nucleus; another, 3×2 m., in white matter of insula. In anterior end of lenticular nucleus there is a softened spot, size of a pea, greyish-red in colour, and somewhat friable. A small one, 2×2 m., in convolution of corpus callosum. On right side a patch in inferior pediculo-frontal fasciculus. *Frontal section*—On left side a depressed spot, 10×5 m., just

above the internal capsule, and at the outer angle of the ventricle. It presents a loose, fibrous arrangement, *état criblé*, and a straw-coloured serum fills the meshes, which in this one are so large that were it not for the fibres crossing from wall to wall it would look more like a definite loss of substance—a cavity. Another smaller spot in convolution of corpus callosum. The caudate nucleus and the outer section of lenticular nucleus present each a small patch; in the former it extends for 2 m. into the internal capsule. A spot, 4×4 m. in sphenoidal fasciculus, just external to descending horn of the ventricle. On *right* side, lenticular nucleus presents two small areas, 2×3 m., with same loose fibrous appearance. In sphenoidal fasciculus of this side there is also a patch, 5×4 m., narrow, and on section looking like a small fissure with greyish walls, between which delicate fibres pass. *Parietal section*—On *left* side a patch, 4×3 m., in middle parietal fasciculus, a few millimetres from caudate nucleus. One in thalamus and one in lenticular nucleus. On *right* side a patch in superior parietal fasciculus, about 12 m. from the grey cortex. In *pediculo-parietal* and *occipital* sections four other small areas were found. In further slicing of the ganglia and parts at the base, two small spots in hinder end of left thalamus; one extends into the crus. None in the corpora quadrigemina. In the pons there are four or five small depressed areas situated towards the under surface, and to the left side; they are more like little cysts in the substance, but the walls are firm and fine fibres cross them. There is a small area in the left anterior pyramidal tract of the medulla.

The membranes of the cord look healthy, and there is nothing special to be observed on superficial inspection beyond a few small cartilaginous plates in the arachnoid on posterior surface. On careful section of the substance, there are no localized spots of induration, but the white matter in the situation of the crossed pyramidal fasciculi on either side has a greyish translucent aspect, which is most marked in the left side. This descending degeneration can be traced through the cervical and dorsal regions, and is confined exclusively to these fasciculi, not approaching the surface at any part.

Thoracic and abdominal viscera presented nothing of special note. Heart normal. Aorta and its branches not atheromatous. Kidneys not fibroid.

Microscopical Examination.—In fresh teased portions of the patches from the brain there is seen : 1. A matrix, composed of extremely delicate fibres, closely interlaced with each other and forming a dense felt-work, the appearance of which resembles a bit of compact areolar tissue. The fibrils are of uniform size, somewhat wavy in their course, and here and there can be traced in connection with elongated fibre cells. 2. Corpuscles, scattered irregularly through the tissue, chiefly of a rounded form, about the size of colourless blood corpuscles, with granular protoplasm and a single nucleus ; some are oval, and have a more translucent protoplasm. 3. Medullated nerve fibres occurring here and there in the matrix, usually two or three being seen in each field of the No. 7 (Hartnack). They are irregular, often broken into short bits, with the medulla coagulated. Towards the periphery of the patches they are more numerous. Some of them can be seen embraced by numerous small fibrils, crossing and interlacing upon the medulla, and forming a miniature basket-work about the fibre. Myelin droplets also occur. 4. Small arteries and capillaries, the former with extensive fatty infiltration of the adventitia, and here and there pigmentary deposition ; the latter with numerous minute oil droplets imbedded in the walls.

Sections of the patches stained in hæmatoxylin or picrocarmine show a very loose arrangement of the tissue in the central part, often only a few bundles of fibres, with a blood-vessel or two, crossing and dividing a large central space. In small ones this gives an alveolated appearance to the patch ; in larger ones, there appears to be a definite loss of substance in the centre, the delicate trabeculae having been torn in the section. The same elements are seen as in the teased bits, but the cells are brought out more prominently by the staining, and appear more numerous. In the wavy bundles of fibres crossing the central part of the small patches the fibres seem larger. The blood-vessels are numerous, full of corpuscles ; many of

them are fatty ; in others, particularly the larger ones, there is an infiltration of leucocytes about the adventitia (perivascular lymph space) to an unusual extent.

This histological condition varied but little in the different patches examined.

Sections of the cord at different ends stained in carmine show a well marked descending sclerosis of the crossed pyramidal fasciculi, particularly of the left side. On the right side the process is not so advanced, the neuroglia not so thickened, and many more axis cylinders can be seen. In the mid-dorsal region the sclerosis in the left side touches the posterior cornu and extends by the side of it nearly to the pia mater. There is no degeneration of the white matter on either side of the anterior median fissure, in the situation of the direct pyramidal fasciculi.

The ganglion cells of the grey matter are very granular, and contain numerous brown grains, chiefly aggregated about the nuclei, and often obscuring a large portion of the protoplasm.

Remarks.—First as to the *diagnosis* of these cases. In case I. there can be but little doubt. The peculiar tremor, thought to be characteristic, was present in a most typical manner; the voice was also becoming scanning. Subsequently the diagnosis was confirmed at the National Hospital for Paralysed and Epileptics in London.

In Case II. the disease is more advanced, and the diagnosis rendered difficult from the fact that in certain of its features it bears a resemblance to one of general paralysis of the insane, in which disease there are tremulousness of the tongue and facial muscles, imperfect articulation, unsteady gait, and sometimes tremor. The mental unsoundness as a rule precedes, as in this case, the somatic troubles. Certainly the appearance of the patient is strongly suggestive of this form of insanity; but I think the following facts are inconsistent with such a view: 1st, his recovery from the attack of insanity, the precise nature of which is uncertain, but he does not seem to have had *folie ambitieuse*; the mental symptoms in general paralysis are usually progressive; 2d, his present mental condition—by this time,

considering the extent to which the paresis has extended, and the duration of the disease, 2 years, we might have expected complete dementia, but the patient, though weak-minded, is still able to give intelligent answers, and has no delusions. Unless we suppose a case in which the advance of the mental symptoms has been checked, while the somatic ones have progressed, this one must, I think, be regarded as an example of insular sclerosis. It must be borne in mind, however, that certain writers on the subject hold that there may be general paralysis without the mental symptoms. Such cases would be very difficult to separate from certain forms of multiple sclerosis. An illustration of the converse of this is afforded by a case of Claus (*Brain*, April, 1879), in which general paralysis had been diagnosed, and multiple sclerosis found after death.

In Case III. the first point to be determined is: do the spots above described correspond to those of insular sclerosis? Essentially they do; for they are localized areas in which the brain substance has been replaced by fibrous tissue, but in certain particulars they differ. The typical spots are firm, of a light, reddish-grey colour, level with, or projecting slightly above, the surface, and of uniform consistence throughout; in this specimen they are firm, cutting with resistance, greyish in colour; in the centre, however, the section is not uniform, but presents a loose mesh-work of fibrous tissue, the interspaces of which contain fluid. Granting this, how do the clinical features of the disease accord with this view? Unfortunately there is no record of the case prior to coming to Hospital, and none could be got from the Mayor of the town from which he was sent. It is evident that we have only witnessed the close of the disease, and among the final symptoms, in addition to the paresis, contractures of the limbs often occur, most frequently of the legs. In this instance the left arm was firmly contracted. Charcot states that the tremor disappears towards the close of the disease, so that its absence in this case need not be wondered at.

These three cases, in the order of the record, illustrate very well the three stages into which the disease has been divided—

early, advanced and final. In the first case, the peculiar tremor and slight defect in articulation were the only symptoms, and the patient was able to follow a light occupation. In the second there is marked paresis of lower extremities, tremor, bulbar symptoms, and impotence. There are no contractures, but the patient is unable to do any work. In the third instance there were contractures, general paresis, dementia, and incontinence of urine and fæces.

The course of the disease is very prolonged, and may last for five or ten years. In the second case the disease has made much greater progress in two years than it had in the first in three.

With regard to the pathology of the disease, the disseminated patches of induration have usually been regarded as the outcome of a slow, chronic, fibroid change—a sclerosis; but Leyden* thinks that the process begins in scattered spots as an acute myelitis or encephalo-myelitis, as the case may be. This may come on suddenly, cause serious symptoms (apoplectiform), disappear, relapse, and finally recovery take place or it becomes chronic. He gives a remarkable case of this kind, presenting typical features of the disease, which after two relapses recovered completely. The condition of the patches in case III. is, perhaps, what might be expected to be produced after an acute inflammatory process, rather than by a slow fibroid induration. In the latter there would be a substitution of tissue, but not necessarily any loss of substance, such as might readily occur in the healing (by absorption of broken down material and increase of fibrous tissue) of a spot of inflammatory softening.

*Zeitschrift, f. Klin. Medicin., Bd. I., 1879.

ON DELAYED RESOLUTION
IN
PNEUMONIA.

BY WILLIAM OSLER, M.D., M.R.C.P., LOND.

Professor of the Institutes of Medicine, McGill University, and Physician to
the General Hospital, Montreal.

(Read before the Medico-Chirurgical Society of Montreal.)

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There is no disease which we are called upon to treat to which the term 'self-limited' can more appropriately be applied, than to pneumonia. It runs such a definite course, uninfluenced, to any material extent, by medicines, and terminates by crisis from the 5th to the 10th day, and in ordinary cases convalescence is complete, in from 10 to 20 days. So uniformly does this happen in uncomplicated cases, that any delay in convalescence or persistence of the physical signs is a cause of considerable anxiety on the part of the physician. I wish to call your attention this evening to two cases illustrating retarded resolution in this disease.

But first let me say a few words on the anatomical condition of the lungs. The stages of the disease are engorgement, red hepatization, grey hepatization and resolution. The essence of the process is an acute inflammation of the walls of the air-cells, accompanied by a free exudation into the alveoli and finer bronchi. In the stage of red hepatization we find the air cells filled with a coagulated fibrinous exudation, enclosing in its meshes many red-blood corpuscles, leucocytes and granular epithelial

cells. The affected part is firm, section dry, reddish in colour, and the granular plugs filling the air cells are very distinct. In the stage of grey hepatization, the air cells are crowded with leucocytes and epithelial products, the extravasated blood corpuscles have lost their colouring matter and the pressure of the exudation has caused anæmia of the alveolar walls, hence the lung is pale or grey. The cut surface may be simply moist or it may be bathed with a quantity of a pus-like fluid, which seems to infiltrate the affected parenchyma and has given the name of purulent infiltration to this stage. We lack satisfactory information of the condition of the lung in resolution and of the details of the process. Doubtless, fatty degeneration and liquefaction of the exudate occur, and it is rapidly removed by absorption and expectoration. When we consider the amount of solid exudation in an inflamed lung, often amounting to several pounds, and the comparatively scanty expectoration frequently seen during the stage of resolution, we must conclude that the process is effected chiefly by absorption. Among the terminations of pneumonia, gangrene, abscess, caseation and fibroid induration are spoken of, but it is still regarded as an open question by some pathologists, whether true sthenic, fibrinous pneumonia ever terminates in these conditions. I have seen instances of both gangrene and abscess in undoubted lobar pneumonia. Indeed, I have often wondered, on the inspection of inflamed lungs in the third stage, soaked in a purulent exudation, the whole tissue swarming with pus corpuscles, that 'breaking' of the lung and formation of abscess did not more frequently occur. Caseation as a sequence of hepatization is perhaps still more rare. That it does not occur is probably due to the integrity and permeability of the blood-vessels of the alveoli. A case occurred two years ago in the General Hospital, in which caseation of the entire lung appeared to have followed a pneumonia, but the man was not under observation from the commencement, and there is room for doubt whether it was a true fibrinous pneumonia (vide Mont. Gen. Hosp. Reports, vol. I., p. 295). Even greater uncertainty prevails as to the termination of a simple pneumonia in fibroid induration, the chronic or interstitial pneumonia of some authors. Occasionally cases are met with in which, without any

obvious cause, resolution of the inflammation does not take place, the physical signs persisting for weeks or even months. This occurs more frequently in children than in adults, in whom it is very exceptional. Leyden has recently called attention to this condition in an article in the *Berliner Klin. Wochenschrift*; he believes that two of the most important factors in its production are enfeeblement of the circulation by the fever, and unusual density of the exudation.

The following instances of this condition have come under my observation, and I have deemed them to be of sufficient interest to bring before you, as they illustrate recovery after persistence of the consolidation for several weeks:

CASE I.* APEX PNEUMONIA. RESOLUTION IN THE 4TH WEEK.

W. S., aged 33, plumber, of average size, was admitted to the General Hospital April 15th, '79. Nothing of special note in the family history. Has been a healthy man. Is not intemperate. On April 5th got heated shovelling snow, and lay down on a sofa near an open window. In about an hour he awoke and immediately had a severe chill, lasting about 20 minutes. Became feverish during the night, had severe pain in the right side, got very hoarse and began to cough. Has been in bed ever since suffering with shortness of breath, fever and cough.

April 16th, 12th day of illness. T. 103°, P. 102. Pulse-respiration ratio 1 to 3.5. Face is pale and distressed looking. On examination, chest well formed, deficient expansion on right side; percussion reveals dullness on right side in front as low as the angle of the scapula, in axilla to 4th rib; blowing breathing and sub-crepitant râles over dull regions, tactile and vocal fremitus increased. Heart action strong, sounds clear. Nothing special in examination of other organs. Cough is very troublesome, short and hacking; expectoration, viscid and rusty colored; bowels are relaxed; urine about 40 ozs, high colored, chlorides present, no albumen. Ordered the Hospital acute pectoral mixture and linseed poultice to the chest.

* Reported by Mr. Emdon Fritz.

The condition on the 13th, 14th and 15th days remained the same. T. ranged from 102° in the morning to 104° in the evening. Respirations about 40; pulse 110 to 120; bowels moved two or three times in the day; has been taking quinine, 10 grs. per diem.

16th day, seems better. Morning T. 100° , P. 84, R. 28, cough less troublesome, expectoration viscid but not so rusty. No change in the physical signs in front, behind the dulness appears clearing a little at angle of scapula and there are some fine sibilant râles in this region.

17th day. T. morning 99° ; evening 100° , P. 81, R. 28; cough not so worrying; expectoration muco-purulent, very slightly tinged; urine more abundant, 50 ozs., not so high colored.

18th day, marked improvement in patient's condition; feels easier than on any day since the attack. T. morning 98° ; evening 101° ; R. 28, P. 84. Dulness is diminishing behind, but is still very marked in the inter and upper-scapular regions. The râles are coarser and the breathing is less bronchial. In front dulness is scarcely so intense, auscultatory signs persist.

21st day, patient continues to improve. T. 100° on previous evening, normal this morning; pulse 80, R. 26; expectoration less abundant. In front the dulness is much less intense; breathing still bronchial in character; râles very numerous at end of inspiration and becoming more liquid in character. Behind the note is much clearer, the breathing is becoming more natural and the râles not so abundant.

24th day, very little difference in the percussion note at apices behind; in front a shade of dulness persists, and on deep inspiration a few râles. Expiration is considerably prolonged and hollow. Temperature 99° . Cough has ceased to be troublesome; expectoration scanty.

26th day (April 30th), temperature normal, feels much better and was allowed to get up for a short time. Râles have disappeared. The prolonged and hollow character of expiration very marked.

From this time patient gained strength steadily and was dis-

charged on the 14th of May. The marked prolongation of the expiratory murmur at right apex persisted.

The treatment throughout was restorative; nourishing food, six ounces of wine and from 5 to 10 grs. of quinine per diem.

CASE II* LOBAR PNEUMONIA OF THE RIGHT LUNG.
RESOLUTION IN 8TH WEEK.

F. S., aged 42, a well built man, was admitted to the General Hospital on May 10th, 1880. Served in the army for 21 years, has been a healthy man, had gonorrhoea and a bubo. Is not a hard drinker.

Initial chill on Monday, May 3rd, followed by fever, cough and pain in right side, which have persisted. On admission face suffused, anxious-looking. T. 102°, P. 117, of fair volume, R. 36, and shallow. Short cough with rusty sputa; complains of pain in region of right nipple. On examination, expansion deficient on right side. Dulness over whole of this side behind and extending well into axilla. In front dull beneath clavicle and for a finger's breadth below it. Blowing breathing, fine râles and exaggerated fremitus over dull areas. Bowels open, urine high colored, chlorides present. On the 11th and 12th the temperature kept about 103°, respirations 35-40, P. 112 to 125. There was considerable distress, and troublesome cough. On the night of the 12th was delirious, and appeared a good deal worse in the morning. At the mid-day visit on 13th the dulness in front was found to have extended as low as 3rd intercostal space. T. 102°, R. 64, P. 120, and smaller in volume. Is slightly cyanotic in face and finger tips. Ordered the stimulants to be increased.

At 10 p.m I went to the Hospital, as I felt uneasy about patient's condition. Found him dozing. R. 66 P. 130, small and weaker than in the morning. Face more cyanotic; finger tips blue. Feeling convinced that the patient was gradually dying of suffocation I ordered him to be bled, and the House Surgeon abstracted xviii ozs. of blood from the arm. Fifteen minutes after, patient expressed himself as much relieved. Respirations 52, P. 106, and of much better volume. In the morning (14th)

* Reported by Mr. J. C. Shanks.

P. 106, R. 40, T. 101. Had a better night, not so delirious. Face still suffused, but not cyanotic.

May 15th (12th day of illness). Feels better. P. 87, R. 30, T. 101.5°; expectoration abundant; rusty colored; cough troublesome. Physical signs persist unchanged with the exception of the râles, which are not so fine as they were. For the next five days the temperature did not rise above 100°, and his general condition improved. Expectoration abundant, less viscid and not so blood-stained; no essential change in physical signs. On the 20th temperature began to rise, and on the evening of the 21st reached 102.5°. The respirations and pulse also increased slightly in frequency, but examination of the chest did not reveal any extension of the inflammation. On the morning of the 22nd, T. was normal, rose to 101° in the evening and until the 29th kept between 101° and 103°, there being no regularity in the exacerbations; on the 23 and 24th, evening exacerbations of 3° took place. During this period the cough has been rather more troublesome, expectoration abundant, less viscid, but still rusty. Note as to condition of lung on the 29th is:—Dulness persists in front to lower border of 3rd rib, and behind from apex to base. In front, inspiration blowing and at the termination there are sub-crepitant râles; in 2nd space it is distinctly wavy. Expiration loud, coarse and prolonged. Behind, bronchial breathing with râles over whole surface, at extreme base the breath sounds are less intense.

From the 31st the temperature remained, with the exception of the morning of the 4th of June, below 100°, the morning record being 97°, and the evening between 98° and 99°.

June 5th (34th day of disease). General condition is improving, cough less troublesome, expectoration more liquid with small yellowish-brown bits scattered through it. Appetite is good and he sleeps well; bowels are freely moved about every second day; amount of urine averaged about 45 ozs; respirations 20 to 25 per minute; pulse 80. Note of this date on the physical signs is:—Dulness unchanged; subcrepitant râles in front; wavy inspiration persists in 2nd space; in quiet inspiration no râles heard behind, only the bronchial breathing, which is in marked contrast to the normal sounds of the opposite side; on deep inspiration,

very fine small crackles at the end of the act ; vocal and tactile fremitus increased.

13th. The past week has made very little change in the condition of the lung, physical signs absolutely the same ; was weighed on the 8th, turned the scale at 120 lbs. ; normal weight over 145 lbs. ; expectoration not so abundant, half of a pint in 24 hours, is more tenacious ; pulse ranges about 76 ; respiration about 20. Measurement of chest gave $16\frac{3}{8}$ inches for left side, $15\frac{3}{4}$ for the right.

16th—(45th day of the disease)—Dulness not so marked from the angle of scapula down, and the note here is rather tubular in character. The râles are more abundant, particularly in superior axillary region ; at the base the breath sounds are feeble than in other parts, but have the same bronchial character. Patient gets up for a little while each day, but feels very weak.

19th. Was weighed ; has gained $5\frac{1}{2}$ lbs. since the 8th.

22nd. In front the dull note is not so marked ; breathing still hollow, and expiration is much prolonged, râles not numerous. The posterior part is also clearing a little, breathing harsh and bronchial, râles scarcely to be heard, except at outer border of scapula. From this date resolution proceeded rapidly.

25th—(54th day)—Dulness in front has almost disappeared ; breath sounds coarse, expiration prolonged. Behind there is only a slight difference to be noticed in the percussion note in the scapular and inter-scapular areas. Two fingers breadth below the angle of scapula the note is decidedly tympanitic. The breathing is coarse and rough, compared with the left side ; râles only at outer border of scapula ; tactile and vocal fremitus still a little exaggerated. General condition is very good ; has scarcely any cough, no fever, and has a ravenous appetite.

Improvement in condition of lung continued, and on the 28th he was discharged, the dulness having entirely disappeared, except a shade at the right base ; breath sounds somewhat coarser and expiration prolonged, particularly noticable in front.

July 8th, 10 days after discharge, reported himself for examination ; weight 137 lbs ; looks much better ; examination of the chest showed expansion to be still a little defective on right side, particularly at the base. Scarcely any difference in the charac-

ter of the breath sounds on the two sides, except at the extreme right base where the respiration is weaker, and there is still a shade of dulness.

The treatment consisted in full stimulation in the early and active stage of the disease, poultices to the chest, moderate doses of quinine, and the iodide and acetate of potash on the supposition that they might favour resolution.

It is difficult to understand how a solid exudation can remain for weeks in the air cells without permanently damaging them, but that it may do so is evident from these and other cases. The lung appears to alter but little, maintaining the features of hepatization. Grisolle gives a case in which death occurred on the 60th day, and yet the affected part looked not unlike the acute stage of the disease.

On July 20th, 1877, I performed a post-mortem on a man who was stated to have been ill with pneumonia for between two and three months. The whole of the left lung was solidified, in a state of grey-hepatization, and the note made at the time was : "resists the knife on section, as if there was hypertrophy of the connective tissue ; lobular division of the lung obliterated." The granular condition was still visible. In this case there was a gangrenous cavity at the posterior part of the organ.

It is not easy to see the reasons for retardation of resolution in these two cases. The situation of the consolidation in Case I. may have had some influence. Of 150 cases of simple pneumonia reported by Bleuler, in 7 resolution was delayed beyond the 20th day, and in three of these the right upper lobe was affected. Huss, and several other writers have noticed the same thing in apex pneumonia. In Case II. the fact of the man having been a soldier for 21 years is rather against soundness of constitution ; though there were no evident signs of degeneration, and he denied excessive use of alcohol. Chomel calls attention to excessive bleeding as a cause of protracted resolution ; but the amount abstracted in this instance was scarcely sufficient to have had any such effect.

I think we can learn from these cases not to be over-anxious about delayed resolution in ordinary pneumonia, so long as the patient's condition keeps up and the constitutional disturbance is light.

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ON HEREDITY IN PROGRESSIVE MUSCULAR ATROPHY AS
ILLUSTRATED IN THE FARR FAMILY OF VERMONT.

By WILLIAM OSLER, M. D., M. R. C. P., LOND.

PROFESSOR OF THE INSTITUTES OF MEDICINE IN MC GILL UNIVERSITY, MONTREAL.

The accompanying genealogical chart of the Farr family illustrates well the hereditary nature of progressive muscular atrophy.

I will first give a brief account of the member of the family who has been under my care: Erastus Farr, aged 47, a farmer, from Vermont State, admitted to General Hospital September 16, 1880, complaining of weakness in the left leg and peculiar twitchings in the muscles of various parts of the body. He is a tall, large-boned man of medium muscular development.

History.—Has been a hard worker, very temperate, never had any serious illness. Is married, has seven children, all of whom are well. About fourteen months ago began to notice twitchings of the muscles of the left buttock and thigh, which gradually increased in frequency, and within six months after their onset he felt the left leg weaker than the right. Has had no pain, only the uneasy sensations caused by the muscular tremors, which he describes as occasionally accompanied by a feeling of nausea. During this year the left leg has got steadily weaker and has diminished considerably in size. The twitchings have also become general and occur irregularly in different muscles.

Present condition.—When stripped, the left leg is seen to be smaller than the right, owing to uniform wasting of the muscles. Measurement gives a difference of 2.5 cent. in the circumference of the calves, and 7 cent. in that of the thighs in the middle third. The atrophy is best marked in the hamstring and gluteal muscles,

and extends slightly to those of the lumbar region of the same side. Fibrillar twitchings are of frequent occurrence in the muscles of the affected leg, and also in those of the trunk and other extremities. The strength of the left leg is greatly reduced. Sensation is less acute than normal in the legs; the points of the æsthesiometer have to be separated over 7 cent. before two impressions are perceived, and there is scarcely any difference in this respect between the legs or different parts of them. The electro-contraction of the muscles is preserved. In walking, patient requires the aid of a stick, and drags the left leg very much. He remained in hospital about a month, and was treated with the galvanic and faradic currents without evident benefit, though he thought himself somewhat improved.

Family history.—Thirteen individuals in two generations have been affected, nine of whom have died.

The following is a brief record of the cases:

Samuel Farr, father of patient, died at age of 61; ill over two years. Patient cannot say what his paternal grandfather died of; never heard that it existed in that generation.

Samuel Farr had five brothers and sisters, two of whom were affected. One brother,

Erastus, who died at the age of 40. This was the first case heard of in the family. One sister,

Mrs. Streeter, who died at the age of 54.

It is probable also that another sister, *Mrs. Stoddart*, had the disease. She died of paralysis, but whether this form or not is doubtful.

Ten members of the second generation have been affected. Two of the patient's brothers and one sister:

Samuel, who died at the age of 45; ill over two years. Had six children.

Wesley, aged 41, at present affected. Has no evident wasting, but the fibrillar twitchings have begun, and he has rheumatic pains. Has two children.

Ellen, died at the age of 27. Had four children.

Six of the patient's cousins, as follows:

Almira (daughter of *Mrs. Stoddart*), aged 45, still living, has been ill over two years. Has two children, one a cripple with legs undeveloped.

Hiram, son of *Erastus*, died at the age of 45. Two children living, one 30 years old.

Four children of *Mrs. Streeter*:

Mrs. Alexander, died at age of 55. Four children living.

Mrs. Robinson, died at age of 46. Three children.

Mrs. Alexander, aged 48, still living, arms much affected ; cannot lift them.

Hiram, died at age of 24 ; ill several years ; disease began in the legs.

Thus, of the 13 members of the family affected, 6 were females and 7 males, a larger proportion of the former than is common in this disease.

With the exception of two, all of the cases occurred, or proved fatal, above the age of 40. Of the 10 instances in the second generation, 5 are the offspring of males (*Erastus* and *Samuel*), and 5 the offspring of females (*Mrs. Streeter* and *Mrs. Stoddart*). The disease has not yet appeared in the third generation, which promises between 40 and 50 individuals, several of whom are over 30 years of age.

I append a genealogical table of this family, in order to show its liability to progressive muscular atrophy, and also reproduce Prof. Naunyn's table of the Bessel family. (*Berliner Med. Wochenschrift*, Nos. 42 and 43, 1873.)

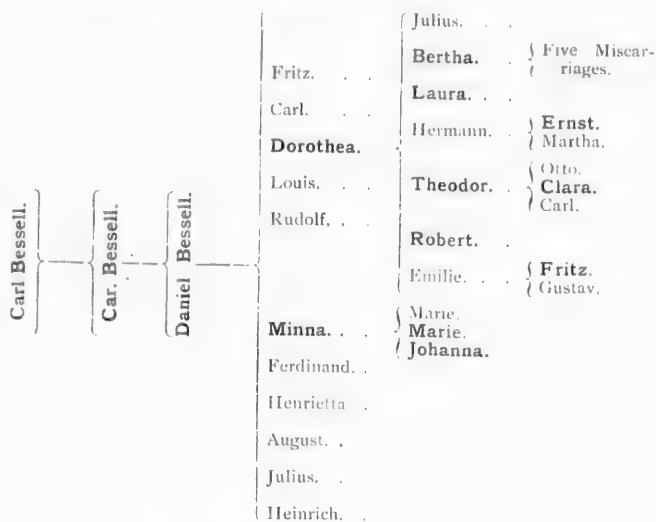
GENEALOGY OF THE FARR FAMILY.

SAMUEL FARR.

Rossin Farr.	5 Children	No disease.
Died at 39.		
Russell Farr.	5 Children.	No disease.
Died at 60. Drinker.		
Samuel Farr.	Samuel. 45.	6 Children.
Died at 61. Ill two years.	Ellen. 27.	4 Children.
	Maria.	
	Rossil.	
	Wesley. 41.	2 Children.
	Erastus. 47.	8 Children.
	Edwin.	
	Matilda.	
	3 Children died of scarlet	
Erastus Farr.	William. 55.	2 Children.
Died at 40. First case heard		
of in Family.		
	William. 35.	3 Children.
	William. died 24.	
Mrs. Stoddart. ?	Adaline.	1 Child.
Died at 40.	Almira. 55.	2 Children. 1 child
	Almond. 60.	3 Children. legs undeveloped.
	Joil.	
	Hiram. 24.	
Mrs. Streeter.	Mrs. Alexander. 55.	4 Children. All well.
Died at 54.	Mrs. Robinson. 46.	3 Children. All well.
	Mrs. Alexander. 48.	
	Mrs. Smith. 38.	
	Mrs. Cleveland. 60.	3 Children. All well.

The individuals whose names are printed in heavy face type were the subjects of the disease—the others escaped.

GENEALOGY OF THE BESSEL FAMILY (NAUNY)



The individuals whose names are printed in heavy-faced type were the subjects of the disease—the others escaped.



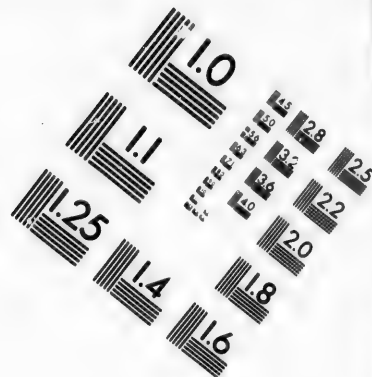
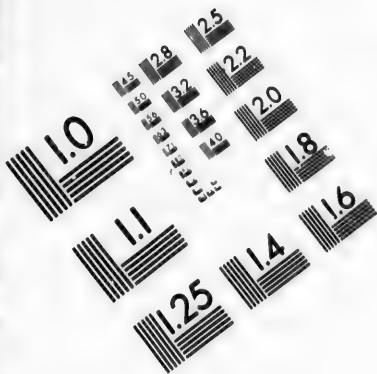
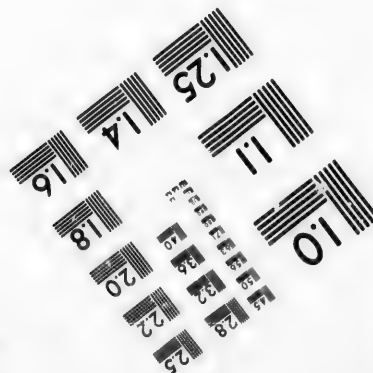
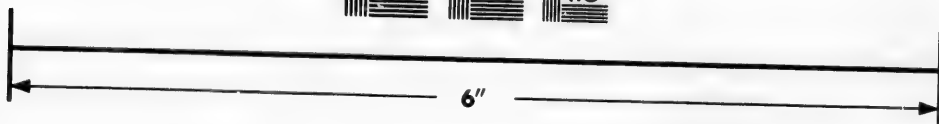
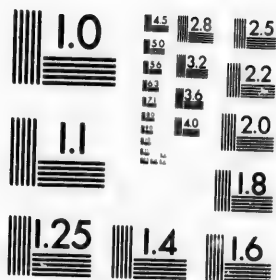


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CASE OF MEDULLARY NEUROMA OF THE BRAIN.

By WILLIAM OSLER, M.D., M.R.C.P. Lond., *Professor of the Institutes of Medicine, McGill University, Montreal.* (PLATE XVIII.)

JOSEPHINE N—, age 16, admitted to the Montreal General Hospital, under Dr Ross, 2nd Dec. 1879.

History.—Has been blind since third year; loss of sight is said to have followed scarlatina. Had measles at eighth year, and shortly after an account is given of what appears to have been a temporary hemiplegic attack, lasting only one day. It is difficult to obtain satisfactory details, as she is in the care of people who know but little of her early history. In July 1878, she began to have headaches, which persisted through the months of August and September, and there appear to have been attacks of spasms of the muscles of one side, lasting for a quarter of an hour each day. She was better in October, and on the 11th of November returned to her studies at the Blind Asylum. She remained well until about two weeks ago, when the headaches returned, and on the 29th of November she had a spasm during the night. Since then the headaches have come on every day. There is no history of syphilis or of any injury.

Present Condition.—Patient is a dark-complexioned, well-nourished French Canadian girl, bright and intelligent, answers questions freely, speaks English, and has made good progress in her musical education at the Asylum for the Blind. The head is not unusually large, decidedly not hydrocephalic, forehead not prominent, the left side is fuller behind than the right. There is complete atrophy of the optic nerves. Has had no vomiting, no fever. Walks well, and has complete command of all the limbs. When first brought to the hospital the gait was irregular and unsteady, and the possibility of cerebellar disease was suggested by the admitting physician. There is nothing of the kind now. Abdominal and thoracic organs healthy. Patient was put upon bromide of potassium, grs. v. every five hours. The headaches were relieved, and she left the hospital

on the 9th, no "spasms" having occurred during her stay. On the 15th she was readmitted. Pains in the head had recurred after leaving the hospital, and on the 10th the head became drawn down by contraction of the muscles of the right side of the neck, and they are now (16th) in a state of firm contraction. There is much pain in the head, chiefly occipital, and there are also pains in the neck and chest. At 10.30 p.m. a hypodermic injection of morphia (gr. $\frac{1}{4}$) was given; at 11 o'clock she was asleep, at 12.30 a.m. was awake, and said she felt easy. At 1.30 a.m. she was found dead. The mode of death was not observed.

Autopsy.—Body well nourished; nothing of note in external inspection. Signs of puberty marked.

Calvaria, at line of section, of average thickness, slightly expanded in parietal regions; left half is decidedly larger than the right. *Dura mater* is so firmly adherent that the brain had to be removed with the skull-cap; membrane is thin; sinuses contain small quantity of blood. When the brain was turned out of the skull a large quantity of clear fluid escaped; the organ is remarkably soft and fluctuating, and when laid on the table the hemispheres collapse as the fluid escapes. The vessels of the pia mater contain blood; arachnoid not opaque. Vessels and membranes at the base look healthy. Convolutions are flattened, and the sulci are almost obliterated. On separating the hemispheres the corpus callosum looks thin, particularly in its posterior half. Projecting from behind it is a large clear cyst, which lies upon the upper surface of the cerebellum. The lateral ventricles were then exposed and found to be enormously distended. So much fluid escaped in the manipulation of the organ that the total quantity could not be estimated, but it must have amounted to nearly a pint. The left ventricle is the largest; the distension is tolerably uniform, but does not affect the anterior cornua so much as the others; the hippocampi are fully exposed. The lining membrane is clear, nowhere granular, and numerous vessels course beneath it. The brain substance of the hemispheres is much reduced. Over the central part, in the region of the parietal convolutions, it is not more than 5 or 6 mm. in thickness. The grey matter is everywhere thicker than the white layer; in the neighbourhood of the fissure of

Rolando the grey layer measured 3 mm., the white only 2 mm. Over the anterior and posterior parts of the distended cavities the brain substance is not so expanded; this is particularly the case with the frontal lobes, the distance from the anterior cornua to the pia mater is here nearly normal. The structures forming the floor of the lateral ventricles are greatly flattened, the corpora striata and thalami appear superficially of large size, especially on the left side. The fornix is very thin; the velum interpositum is closely adherent on the left side to the tumour to be described, and its vessels are full. The choroid plexuses look natural, though flattened. The clear cyst, projecting beyond the corpus callosum, is directly continuous with the ventricles. It has flattened the upper surface of the cerebellum and the corpora quadrigemina, the nates and testes being scarcely distinguishable. The membrane enclosing the cyst above is thin and clear.

Lying upon the left thalamus opticus is a brownish yellow elevated mass, about 3 cm. in length, 2.5 cm. in breadth, extending over the choroid plexus towards the descending cornu. At the inner side it is attached to the fornix, beneath which it extends, and is continuous with a rounded greyish-white body in the third ventricle. The part on the thalamus is firm, and several yellowish-brown bands pass from it over the corpus striatum. The choroid plexus lies beneath its hinder part, and is closely adherent. On the surface are several small calcareous particles. The growth in the third ventricle, when fully exposed, is found to project from the upper part of the side of the thalamus, and to be continuous with the mass in the lateral ventricle. It occupies the anterior half of the third ventricle, touching the thalamus of the other side, and in front is closely united to the pillars of the fornix. It has a greyish colour, is soft, surface smooth, and altogether it has the appearance of a young, rapidly-growing neoplasm. On making an incision through the anterior part of the tumour, it is found to extend to the depth of about 8 mm., has a greyish brown translucent aspect, and though it appears to grow directly from the thalamus, yet the difference in the two is evident. At this section also the growth in the third ventricle is cut, and is seen to be lighter in colour, and is of softer consistence than the main mass. The

tumour gets thinner as it passes backward, but maintains the same structure throughout. The substance of the thalamus looks normal, and is the same on both sides. Corpora striata and lenticular ganglia much flattened, normal-looking on section. The aqueduct of Sylvius is almost closed. Corpora quadrigemina, crura, pons, and medulla present when sliced a normal appearance. Cerebellum presents a flattened depression on its upper surface; substance is healthy.

Optic nerves and tracts firm, small, and atrophic.

The examination of the thoracic and abdominal organs revealed nothing of note in this connection.

Histological Examination.

Tumour on Thalamus opticus.—The matrix or ground substance is granular in character, resembling closely that of the cerebral grey matter (fig. 1). The granules are small and dark, and in places little spherules are mingled with them. Towards the surface, where the mass is firm, there are numerous fine interlacing fibrils passing through the matrix, and they are also abundant at the inner part of the mass, where it is continuous with the growth in the third ventricle. In the matrix are—

(1.) Small corpuscles, about the size of white blood corpuscles, of various shapes, some round or ovoid (figs. 2 and 3), with large vesicular nuclei; others stellate, with three or more fine processes (figs. 4 and 5).

(2.) Large cells, looking like ganglion cells (figs. 1, 6 and 7), having processes, darkly granular protoplasm and large nuclei. They are elongated or flattened, with one, two or more processes, which can sometimes be traced for a considerable distance in the matrix. The nuclei are large, usually single, and about some of them an aggregation of brown granules was observed. They are tolerably abundant throughout the substance. The measurement of these cells ranges from 0.300 to 0.550 mm. In addition, there are rounded granular cells without processes, which are occasionally seen in groups of six or eight.

(3.) Medullated nerve fibres (fig. 8); seen best in teased preparations taken from the central and inner portions of the

mass. They have a distinctly double contour line, the inner one often irregular, and in many fibres the coagulation of the medulla could be seen, while small rounded masses of it (myelin drops) occur here and there in the field. These nerve fibres were abundant in some bits, scanty in others.

(4.) Delicate translucent fibres, with peculiar bead-like swellings at different parts (fig. 9). They are tolerably uniform in size, and the swelling occurs irregularly in their course; frequently a fibre appears to end or begin in one. The substance of the enlargement is uniform with, and continuous into, that of the fibre. In places these are numerous, particularly towards the mass in the third ventricle.

(5.) Giant cells, few in number, with 8-12 nuclei, and dark granular protoplasm.

Tumour in Third Ventricle.—Teased bits show a structure differing in many respects from the one above described. It is composed of—

(1.) Large spindle-shaped cells, which, with their greatly elongated processes, make up the chief part of the mass. They look like enormous connective-tissue corpuscles (fig. 10), and vary in size and general appearance. Some are very slender, and taper gradually; others are more distinctly spindle-shaped, and the processes can be traced for a considerable distance before assuming the delicacy of a fibril; in others, again, the processes are broad and flat, not tapering, but keep the same diameter, or even increase a little in width. In several cells such a broad process was observed to leave one end, while a fine delicate one was given off from the opposite side (fig. 11). So elongated and attenuated do these processes become, that a small teased bit looks as if it were composed almost entirely of somewhat coarse areolar fibres, among which corpuscles were scattered; but a careful examination shows that the fibres are only the prolonged extensions of large cells. Isolated cells were measured as much as .4130 of a millimetre in length. The majority of the cells present elongated nuclei occupying a large portion of the centre of the cells; in some it is distinctly vesicular in character; in others, granular, with indefinite outlines. The protoplasm of the cell body is either homogeneous or very finely granular, and a

similar appearance is presented by the processes. The fibrils measure from $\cdot 00166$ to $\cdot 0025$ m. in diameter.

(2.) Scattered amongst the preceding are a few cells like them in general outline and in the prolongation into fibres, but differing in the extraordinary translucency of the protoplasm and the absence of a nucleus (fig. 12). The term "vitreous" best expresses the appearance of these structures. Some of them were quite as long as the ordinary forms; one was observed which extended through two and a half fields of the No. 9 in. (Hartnack). In several a few fine granules were noticed about the broader parts, but as a rule the body and processes maintained a uniform and remarkable translucency.

(3.) Large granular corpuscles, interspersed among the fibre cells, and of very varied sizes and shapes; some are flask-shaped, with a single clear process (fig. 14); others are large, broad, flattened, bipolar cells (fig. 13). The nuclei are large, sometimes granular; in some no nucleus could be seen. The protoplasm is in most granular, in a few clear. The processes are flattened, not long, and resemble strongly the broader variety of process seen in the cells described under (1). These cells often occurred in groups, accompanied by smaller rounded ones, very granular, with distinct nuclei, but without processes.

Remarks.—The so-called medullary or ganglionic neuroma is perhaps the most uncommon form of tumour met with. So far as I can ascertain, no case has been reported in the British journals. The literature of the subject is fully given in Virchow's work on Tumours.¹ In most of the instances there referred to the new growth was in the lateral ventricles, and, as in the present case, in connection with hydrocephalus. In a few the growth was situated in the white substance of the centrum ovale.

From the description above given, there can be no doubt that the tumour on the left thalamus is composed of a tissue similar to brain matter, and from the situation and the continuity with this ganglion, it may probably (with others of the same kind) be regarded, as Laucereaux suggests, as an *heterotopy* of the grey substance rather than a true neoplasm. Indeed, this writer²

¹ French edition, vol. iii. p. 457.

² *Traité D'Anatomie Pathologique*, tome i. 467.

holds that if all the cases which can be regarded as malformation of the brain substance be ruled out, the existence of a true neuroma of the brain is doubtful. The histological interest of this case centres in the growth which occupies the anterior half of the third ventricle, and which is continuous with, though differing from, the tumour on the thalamus. What is the nature of the enormous spindle cells of which it is in great part composed? Do they correspond to connective-tissue corpuscles, or are they modified nerve cells with greatly extended fibrillar processes? The only form of tumour which has such enormous fibre cells is the large spindle-celled sarcoma; but such a growth has never been found in the brain, and, moreover, the processes of its cells do not, I think, ever become prolonged into such delicate fibrils as in this case,—at any rate, with retention of the character of the cell itself. The only instance I can find of a brain tumour containing somewhat similar elements is one referred to by Lancereaux,¹ occurring in the white substance of the left hemisphere. It was composed of large cells, many of them fusiform, with ribbon-like processes. In the figure which he gives, certain of the cells bear a resemblance to the ones above described, and he regards them as probably nervous in character. I am inclined to take the same view in the present instance. The majority of the cells are greatly elongated, with flattened or attenuated processes, and look like large connective tissue corpuscles; among them, however, are corpuscles which resemble ganglion cells, and possess also similar ribbon-like processes (figs. 13, 14). I believe that a careful study of the growth warrants the supposition that the elongated fibre cells are transformations of structures closely resembling nerve elements. The peculiar fibre cells above described, with extraordinarily translucent protoplasm and no discernible nuclei, are structures which, though unlike nerve fibres in general appearance, remind one strongly of the gelatinous fibres of Remak. On the view that these elongated cells are transformed nerve corpuscles, what are the fibre-like extensions in connection with them which cannot be distinguished microscopically from areolar fibres? Though a somewhat heterodox view, it appears probable, from the researches

¹ *Loc. cit*

of Stricker and Unger,¹ that nerve cells may give off processes which pass into connective-tissue fibres, and these authors regard the protoplasmic processes (with their fibrillar extensions) of the cells of the central nervous system as of this nature. If such is the case, we can look upon the fibrillar extensions of the cells in this instance as constituting in reality, what they so much resemble, connective-tissue fibres, or we can suppose a transformation or degeneration of the nerve cells into fibre cells.

Doubtless, as Virchow supposes, the malformation forming the tumour in the thalamus, was congenital. The early blindness at the third year, and the hemiplegic attack at the eighth, favour this supposition.

The hydrocephalus can scarcely have begun in early childhood before the closing of the sutures, else the head would have become enlarged. It was only in July 1878 that she began to suffer from headaches and to have unilateral "spasms," and it may be that the distension of the ventricles dates from about this time. The tumour in the third ventricle looks recent, and it may have been its growth and the increasing induration about the mass on the thalamus (to which the velum interpositum was firmly adherent) which caused pressure on the venæ Galeni sufficient to induce the ventricular dropsy.

Clinically also the case is of interest, chiefly from the negative character of the symptoms. Headache was the only prominent one during her first stay in hospital. On the second admission the muscles of the right side of the neck were strongly contracted, and the pain in the head was severe. The cause of the sudden death could not be ascertained. The mental condition of the girl was remarkable, considering the degree of hydrocephalus and the extent of atrophy of brain substance. In the majority of such cases there has been more or less impairment of the mental powers, but this girl appears to have had quite the ordinary intelligence, and for her station, and considering also her blindness, was well educated.

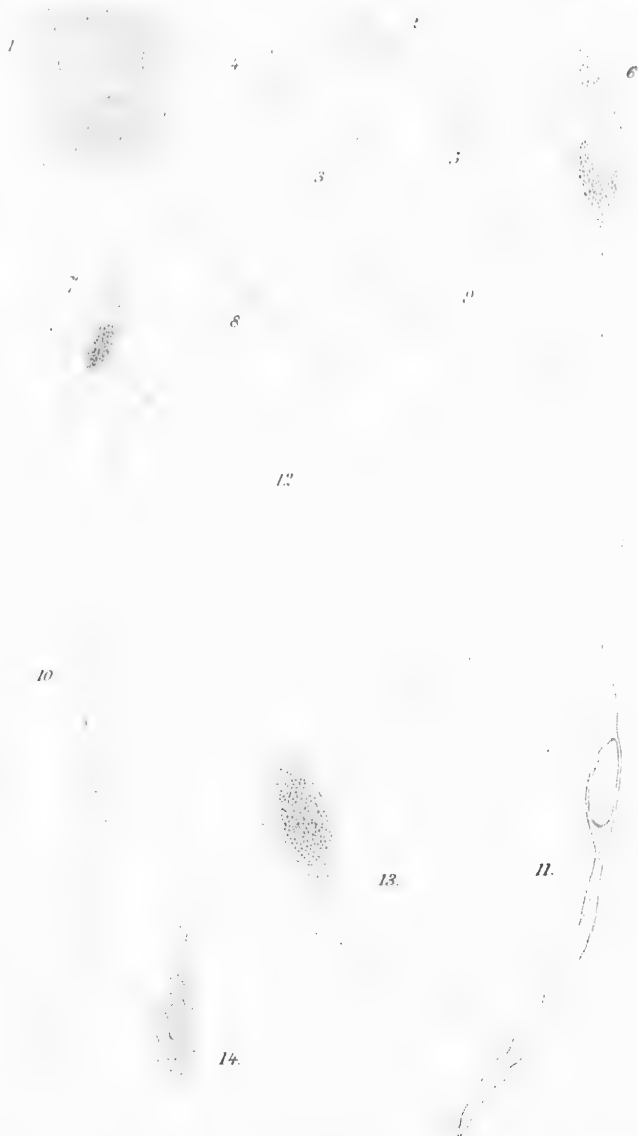
¹ *Vorlesungen über allgemeine und experimentelle Pathologie*, von Dr S. Stricker, III. Abtheilung, II. Lief., 1880.

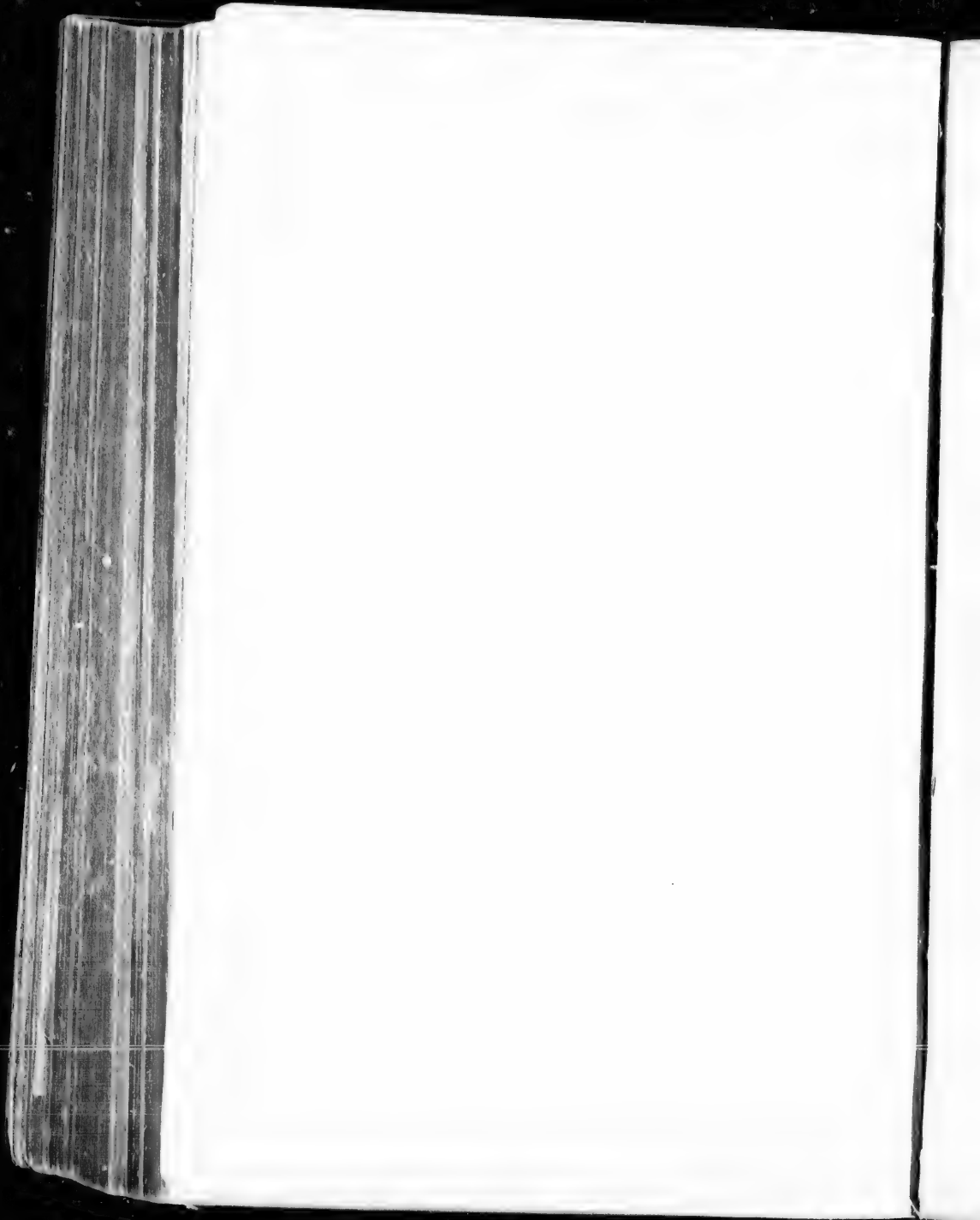
EXPLANATION OF PLATE XVIII.

1-9. From mass on left thalamus.

10-14. From tumour in 3d ventricle.

- (1), General appearance of the matrix, with a ganglion cell imbedded in it; (2, 3, 4, and 5), small cells, some looking like corpuscles of the neuroglia; (6 and 7), large ganglion cells; (8), double contoured nerve fibre; (9), fibres, probably nervous, with curious head-like swellings; (10 and 11), elongated fibre-cells from mass in 3d ventricle; (12), very translucent fibre without nucleus; (13 and 14), cells resembling nerve corpuscles, with ribbon-like processes.





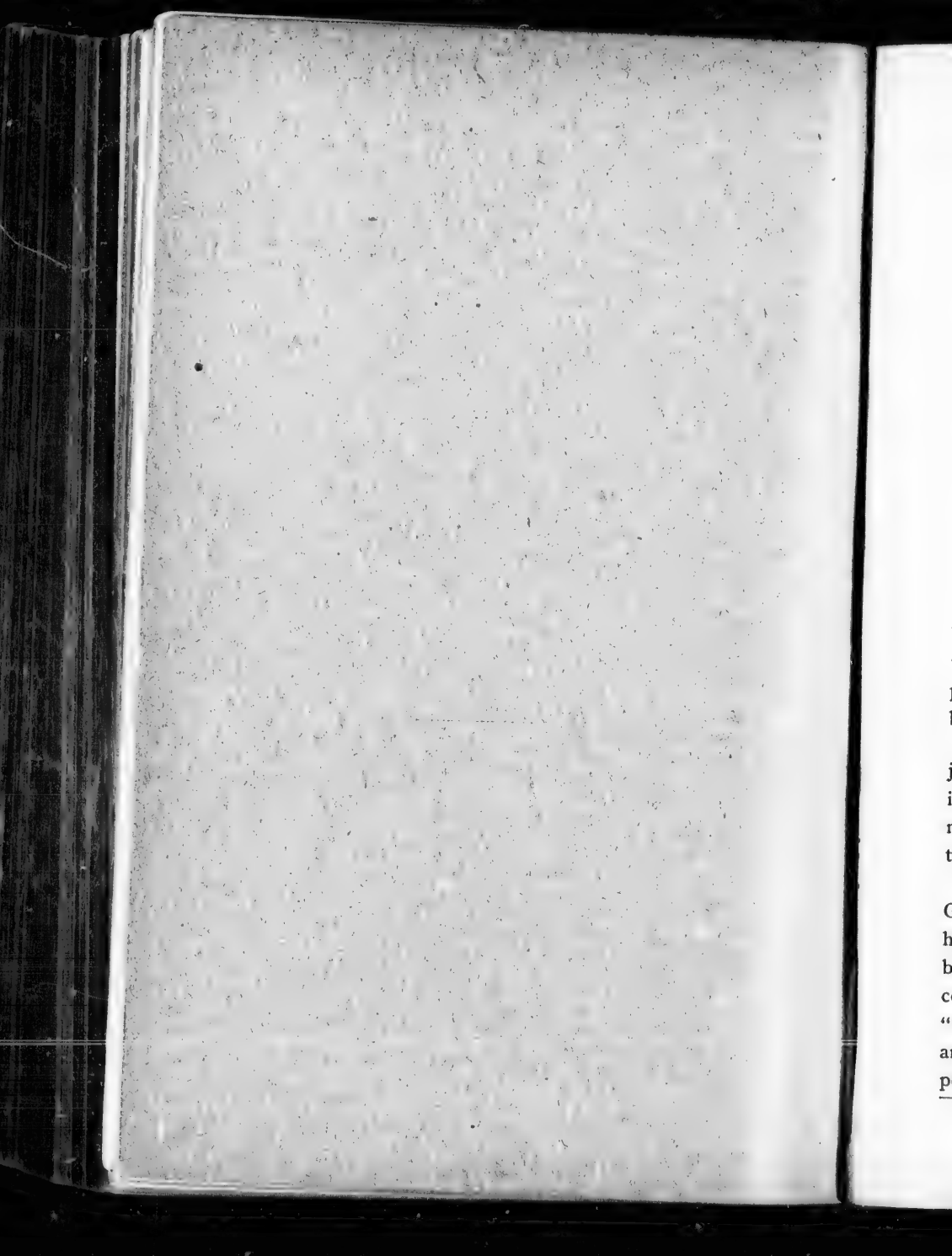
INFECTIOUS (SO-CALLED ULCERATIVE)
ENDOCARDITIS

BY

WILLIAM OSLER, M. D., M.R.C.P., LOND.
PROFESSOR OF THE INSTITUTES OF MEDICINE, MCGILL UNIVERSITY ; PHYSICIAN
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INFECTIOUS (SO-CALLED ULCERATIVE) ENDOCARDITIS.

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UNDER the terms *diphtheritic, ulcerative, malignant, septic, or infectious* endocarditis, *arterial pyæmia, mycosis endocardii*, physicians now recognize one of the most formidable of cardiac affections, characterized by a peculiar morbid process on the valves, blood contaminations, constitutional symptoms of the typhoid or pyæmic types, and usually associated with multiple emboli.

It is only within the past few years that the subject has received due attention in the text-books ; indeed, in some it is barely touched upon, and even in recent manuals on heart disease the account is not very satisfactory.

From the number of reported cases in French and German journals, and from the interest which the disease has excited in these countries, we might suppose it to be more common there than in England or America. A considerable number of reports, however, occur in the "Transactions of the Pathological Society of London" and in the British journals. In the leading American periodicals there are very few references, but cases have

Reprinted from the ARCHIVES OF MEDICINE, Vol. v, No. 1, February, 1881.

been reported by Ellis,* Lomax,† Pepper,‡ Keating,§ and Peabody.||

With regard to the nomenclature, I think the terms *infectious* and *septic*, as given by Jaccoud,¶ better than the others. Against the name *ulcerative* is the fact that there may be no actual ulceration on the valves, and there may be, on the other hand, endocardial losses of substance without the special constitutional disturbances by which the disease is characterized. The term *diphtheritic* is good, in so far as it expresses a resemblance in the histological features of the valvular disease to that of true diphtheritic exudation, but this is scarcely sufficient ground for its use; and it is, in a way, misleading, indicating a relation between diphtheria and the disease, which is not known to exist. The name *mycosis endocardii* certainly expresses a striking feature of the local process, but with our present imperfect knowledge of the relation of the micrococci colonies to the disease, such a designation is, to say the least, premature. On the other hand, the term *infectious* presupposes no special view as to the nature of the local process, and at the same time indicates, as Jaccoud says, a constant and exclusive character of the disease.

It would appear that, clinically, three classes of cases are included in the disease known as ulcerative endocarditis, and I think it important that a distinction should be made between them. We have:

1. Those cases in which the disease appears without any obvious cause, either spontaneously or in connection with rheumatism or some other affection. The term *infectious*

* *Boston Med. and Surg. Journal*, Nov. 15, 1877.

† *Philadelphia Medical and Surgical Reporter*, 1874.

‡ *American Journal of Medical Sciences*, 1871.

§ "Transactions of the College of Physicians of Philadelphia," 1879.

|| *New York Med. Record*, 1880.

¶ *Pathologie Interne*, tome i, and *Nouveau Dictionnaire*, tome iii.

might be applied to this class. It is the *arterial pyæmia* of Wilks, the primary ulcerative endocarditis of some authors.

2. Those in which the endocardial disease is secondary to some inflammatory focus—acute necrosis, puerperal endometritis, etc. To these the term *septic* might be applied.

3. In certain cases of chronic valvular disease an acute endocardial process may be engrafted (recurrent endocarditis), presenting anatomical features similar to the infectious form, but not characterized by the same clinical picture, the patients dying with the symptoms of chronic heart disease.

The following paper embodies my experience of this disease. The chief points to which I wish to call attention, and which are illustrated by the cases, are:

1. That the majority of cases of infectious endocarditis occur independently of rheumatism.

2. To the frequency with which infectious endocarditis is associated with pneumonia.

3. The production of acute multiple aneurisms of the aorta in the disease.

4. To certain histological features in the endocardial vegetations, and particularly to a remarkable fungoid growth met with in one of the cases.

CASE 1.—In January, 1878, I received from Mr. McEachran, of the Montreal Veterinary College, the heart and part of the aorta of a cow which had died with symptoms of urgent dyspnoea. He saw it only a short time before death, and no satisfactory history of the case could be obtained. The weather was very cold, and the heart was frozen immediately after its removal, and in this state I received it.

The organ was large, particularly the ventricular portion; the chambers had been cut open, and the blood had escaped. On exposing the tricuspid orifice, from the auricle it appeared to be almost closed with irregular vegetations attached to the valves. From

the ventricle the following condition was presented: The segment next the septum was completely covered on its under surface with a grayish-white outgrowth, which was prolonged at the apex and extended about half way over the auricular surface. The chordæ tendineæ were entirely covered, and similar masses extended down the septum, forming irregular warty projections, some of which were the size of large cherries. The other segments were not so much involved, but in both the growth was most extensive on the ventricular surface, and irregular masses projected from the tips of the cusps, which resembled somewhat the comb of a cock. The chordæ tendineæ were uninvolved. Pulmonary semilunar valves healthy; mitral valves unaffected. Aortic orifice blocked with vegetations similar to those in the tricuspid. On slitting up the vessel the segments of the valve were found much crumpled and covered on the ventricular surfaces with warty outgrowths, some of which were over a centimetre in length.

In the ascending portion of the arch there were several small outgrowths on the endocardium, and near the terminal portion of the arch there was a much larger, irregular mass. All of these structures presented a similar appearance—grayish-white in color, of moderate consistence, but on firm pressure somewhat friable. They were very closely adherent to the parts from which they grew. An outer cortical and an inner parenchymatous part could be distinguished. It appeared a typical example of a verrucose endocarditis. The other organs were examined, but I could get no information as to the presence of infarcts.

CASE 2.—*Infectious endocarditis; pneumonia; meningitis.*

Mary D., aged 29, admitted to hospital October 22, 1878, in an unconscious state. She is a married woman, and has two children. Has been a hard drinker for several years. History of the onset of the attack could not be satisfactorily obtained. On the 23d, when examined, she was still unconscious; pupils moderately dilated; no twitchings or paralysis; slight dulness at right apex, with blowing breathing and râles; systolic murmur at apex. T. 104°; P. 110; R. 40.

On the 24th, she was partially conscious for a short time, and complained of great pain in the head and back of the neck. Morning, T. 100°; Evening, 104°.

Throughout the 25th she lay in an unconscious state; passed feces and urine in bed. Evening, T. 104° .

On 26th, temperature rose to 107° at 4 A.M.; was 105° at 2 P.M. There was a slight divergent strabismus of left eye, and commencing superficial ulceration of left cornea. Right pupil dilated widely. Death took place at 4 P.M.

Autopsy.—In the *heart*, ventricular surface of anterior segment of mitral valve was covered with grayish vegetations; toward the right side of the valve they were larger, and extended to the chordæ tendineæ, passing down the entire length of several of them. On the auricular surface of the valve there was a soft, grayish-white patch, 1 by 1.2 cm., covered in part by a thin membrane, but in the rest of its extent rough and divided into a number of irregular projections, which were friable and readily detached. The other valves were healthy. In the right *lung* the upper lobe was in a state of red hepatization; toward the anterior border the process was more advanced, and a sero-purulent fluid bathed the surface. The upper third of the lower lobe was also inflamed. In the *brain*, meninges at the base were matted and oedematous, but there was no exudation. On the hemispheres there were numerous patches of lymph beneath the arachnoid, situated chiefly in the anterior regions. The posterior margin of corpus callosum and contiguous surface of cerebellum were covered with a thick, creamy exudation.

Spleen presented a single infarct. Organ a good deal enlarged.

Kidneys healthy. Nothing special in other organs.

CASE 3.—*Infectious endocarditis; pneumonia.*

J. B., aged 38, admitted January 7, 1880. Has been a healthy man.

Ten years ago had a severe attack of pneumonia. On the night of the 4th he felt uneasy, and did not rest well; got feverish, and in the morning had pain in the side, with cough. These symptoms continued, and he came to the hospital on the 7th. On admission, T. 103.8° ; P. 128; R. 40. Signs of pneumonic consolidation in right lung; dullness from second rib in front, and extending into the lower axillary region and the base posteriorly. There were blowing breathing, râles, and increased tactile fremitus. The expectoration was viscid and rusty. During the first week in hospital nervous symptoms appeared; he became delirious, rest-

less at night, and passed urine and fæces in bed. Tongue dry, and on the 9th and 10th there was troublesome vomiting. The temperature was irregular, ranging from 100° to 104° ; the evening record was usually a little higher, but twice it was lower than in the morning. Pulse range 120 to 148; respiration 32 to 50. During the second week the intensity of the symptoms abated somewhat; the temperature kept lower, not once reaching 101° . Respiration diminished in frequency, and the pulse range was from 112 to 120. The nervous prostration continued, with tremor of the whole body; the muscles of the face and hands twitched constantly. Delirium persisted, and discharges were passed involuntarily. A very disgusting fetor emanated from his body. The cough improved, and the dulness diminished somewhat in front. Tongue dry; took food and stimulants freely.

On the 19th, a painful swelling appeared in left parotid region. In the third week he began to have chills, and sweated a great deal each day. The swelling in left parotid diminished, and the lung cleared. The prostration continued and the delirium persisted, but the twitching moderated. The temperature was very irregular, usually below 100° , but on two occasions it went up to 103° after chills. Pulse range from 116 to 130.

During the fourth week the swelling of left parotid increased, and on February 1st an abscess was opened in this region. Severe chills on the 30th, blueness of face and finger-tips. T. 102° . Still sweats. Became somewhat brighter after the abscess was opened. Tongue dry; nervous symptoms less marked. No cough. Pulse feeble, range 108 to 120. Temperature 98° to 100° ; on three days after chills it rose about 102° .

In the fifth week he remained in this typhoid condition, with very little change; an occasional chill and profuse sweats.

During the sixth week the prostration increased, and he lay in a heavy, unconscious state. Tongue dry and cracked; no chills, but profuse sweats.

On the 13th and 14th, T. began to rise, and reached 104° . Muscular tremors again set in, and death took place on the 15th, after an illness of 42 days.

Autopsy.—Body wasted; in preliminary incision thoracic and abdominal muscles pale.

Heart of average size; not apparently hypertrophied. Coagula in all the chambers. Valves on right side normal. In left ventricle a large mass filled the outer angle of the mitral orifice, looking like a fibrinous clot between the valves, but on closer inspection

tion it proved to be a large endocardial vegetation. Viewed from the ventricle, the outer half of the aortic or anterior segment was involved, and the disease had penetrated the entire thickness of the valve, projecting in grayish-white, flattened masses between the points of attachment of the chordæ tendineæ. On this surface it extended to within 1.5 cm. of the semilunar valve. The posterior mitral segment was not so much involved on this surface, but at the outer angle between the two flaps, the mass was very thick, and extensions from it passed along the chordæ tendineæ to the top of the posterior papillary muscle. The full extent of the disease was seen when the mitral ring was laid open—a thick grayish mass encrusted the auricular surfaces of the outer halves of both segments, filled the angle between them, and extended up the wall of the auricle. On this aspect it measured 3 by 2 cm. The surface of the mass was nodular, in great part of its extent unbroken, and covered with a thin membrane, which could be lifted up. In places there was extravasated blood beneath this thin coating. The portions upon the wall of the auricle and on the contiguous part of the valves were roughened and granular. The anterior curtain was most affected, but the vegetations on the posterior projected much more. Section through the mass on this segment gave a thickness of 12 mm.; no proper tissue of the valve could be seen, but only a uniform, finely-granular, grayish-white tissue. Aortic semilunar valves healthy. Aorta not atheromatous.

Lungs crepitant in upper and anterior parts, heavy and œdematous posteriorly; the tissue of the right lung at the base was firmer than that of the left, but the section was not granular.

Spleen large, weighed nearly 400 grammes; pulp very soft; one wedge-shaped infarct of grayish-yellow color.

Kidneys pale; no infarcts.

Liver soft, and of a muddy-brown color. There was nothing of special note in the *stomach* or *intestines*. Peyer's patches not swollen.

The *brain* presented nothing abnormal.

In the *left parotid* the abscess had nearly healed.

CASE 4.—*Infectious endocarditis; pneumonia; meningitis.*

M. W., aged 43, a tall, well-built man, was admitted to hospital under Dr. Ross, Feb. 26, 1880. Served his time (21 years) in the British Army. Has had syphilis, and only a month ago was under treatment in ward 11, for syphilitic ulcers in right

gluteal region. On Oct. 27, 1879, he was admitted with pneumonia of lower three-fourths of right lung and had severe cerebral symptoms. He has been a very hard drinker.

On evening of Feb. 23d had a severe rigor followed by fever, headache, cough, and pain in the left side. On admission T. 100° , R. 38, P. 120. Cough with viscid expectoration. Has spells of vomiting and feels very weak. Examination of chest revealed dulness, blowing breathing, and crepitant râles at left base as high as angle of scapula.

27th. T. 101° , E. 101.4° , P. 128, R. 34. A friction sound is heard just above the angle of the scapula on the left side.

28th. T. M. 99.4° , E. 100° , R. 36, P. 114. Patient became delirious through the night, expectoration profuse and blood-tinged.

March 3d. For the past three days patient has been improving slowly; cough not so troublesome; no special change in the physical signs. Temperature has fallen and has been only 98° for the past three mornings. Is free from delirium.

4th. Patient had a chill at one o'clock P. M. accompanied by vomiting, and the temperature rose to 101° .

5th. Had a restless night, delirious again, no extension of the disease in the lung; at two o'clock P. M. had a chill, and the temperature went up to 103.5° , P. 104, R. 40. Has had five stools.

6th. Morning T. 98° . Patient is very prostrate, passed a restless night, there is a low wandering delirium.

7th. T. rose to 103.5° from 98° during the morning; very profuse diarrhœa, 10 stools.

8th. Morning T. 100° , E. 104.3° . Dulness persists at left base, râles more liquid in character; diarrhœa is better.

9th. Patient is in a low typhoid state, tongue coated and dry. T. went up to 105.3° in the evening, R. 36, P. 126, and feeble.

10th. Profuse diarrhœa, nine stools; is very prostrate. P. 124, R. 36, T. morning 101° , evening 102° .

From this time until his death on the 14th he gradually sank, remaining unconscious. The temperature range was from 101° to 104° , the evening exacerbation being usually about three degrees. On the 12th there were signs of œdema at right base. The amount of urine passed ranged from 40 to 50 oz., acid in reaction; there was albumen on the first three days after admission. Chlorides were diminished; on the 2d of March they were absent.

Autopsy. Nothing special on superficial inspection. *Brain*; at base membranes a little œdematous, no lymph. An aneurism the size of a pea projected from the central part of the basilar artery and has formed a bed for itself in the pons. There was considerable meningeal inflammation on the left hemisphere; the posterior part of the 1st frontal and the ascending frontal convolutions were covered with a thick creamy lymph, and a similar condition existed along the outer part of the Sylvian fissure and over part of the ascending parietal convolution and the superior parietal lobule. On the right side there were a few patches of lymph along certain of the vessels, but none on the convolutions. Nothing special noticed in the substance of the organ. *Heart.* All the chambers contained blood and partially decolorized clots. Left ventricle looked a little large. Mitral orifice not enlarged, valves thin and healthy-looking; on auricular surface of the edges numerous small bead-like vegetations. Aortic orifice obstructed with large irregular vegetations, which, on slitting up the vessel, were seen to spring from the right posterior segment. The ventricular surface of this valve was almost covered with a grayish-yellow outgrowth irregularly divided into two portions, the pointed ends of which were covered with closely adherent blood-clot. The surface of these masses was smooth, though nodular; it was only in the cleft between them that the granular substance of the vegetation was exposed. From the arterial side it was seen that one-half of the valve was completely destroyed and the gray-green tint of the substance of the growth was here very marked. There was one small patch on the ventricular face of the anterior segment. *Lungs.* Lower three-fourths of the left lung heavy, airless, reddish in color, except at anterior border where it is more anæmic. Granular condition of section not very distinct. Pleura of this part covered with a thin exudation. Other parts of the lungs crepitant. *Spleen* is large and very soft; no infarctions. *Kidneys.* Left presented one small infarct the size of a pea. Organs are soft and cortices a little swollen. *Liver* pale and soft. *Intestines* pale, no ulceration.

Cases 3 and 4 offer typical examples of this disease;—the chills, irregular temperature, sweats, and diarrhœa were very characteristic. Case 3. conformed more to the typhoid form, Case 4 to the pyæmic variety.

CASE 3.—Chronic valvular endocarditis; recent endocarditis and endarteritis; multiple aneurisms of aorta; rupture into pericardium.

Robert I., aged 37, a hospital orderly. When seven years old had a severe burn in right axilla and front of chest, which has left a large scar. Has been troubled with palpitation since a lad, and during the past few years this has become worse, particularly on exertion. Has been a sailor. In 1876 was treated in the hospital for syphilis, and was told he had aneurism. He had a sharp attack of quinsy in February, 1879, and in the clinical report it was then noted "that the heart was somewhat hypertrophied, double murmur at base, and a distinct systolic thrill could be felt in the aortic area." Unfortunately the notes of his final illness are very scanty. I have been furnished with the following by Dr. Imrie, the House Surgeon: Patient was readmitted on June 4, 1880, with a history of diarrhœa of several days' standing, chills, headache, dyspnœa, cough and fever. On examining the lungs there were signs of pneumonic consolidation at left base, dulness, blowing breathing, râles and exaggerated fremitus; temperature 104° , and he became delirious the same evening. Heart embarrassed; distinct double aortic murmur, and basic thrill. The inflammation of the lung extended and involved nearly the entire organ. There was great nervous prostration, a low delirium, and distinct chills at intervals. The temperature ranged from 99° to 105° ; death took place on July 1st.

Autopsy.—Body somewhat emaciated. In thorax there was a rounded tumor beneath the first piece of the sternum, and which passed to the right beneath the first two ribs and the clavicle. It was quite soft and had no superficial adhesions. Pericardial sac looked large, and when opened, 18 ounces of blood and clots were removed. The source of the hemorrhage was discovered to be a laceration in an aneurismal pouch which projected into the pericardium from the ascending aorta.

Heart.—Auricles contained blood and thick clots; there were numerous small ecchymoses beneath endocardium of the right side. Right ventricle small in comparison with the left; tricuspid and pulmonary semilunar valves healthy. Left ventricle dilated and hypertrophied, its walls unusually thick. Mitral orifice measured 11 cm. in circumference; valves opaque; chordæ tendinæ thick; aortic valves incompetent; segments thick and curled at the edges; the anterior and left posterior segments have

fused together, and from the ventricle, presented the appearance of a single curtain, but on the arterial side, a median raphé passed half way up the segment and divided the sinuses incompletely. Attached to the thickened border were four grayish vegetations, the size of small peas; and on the right posterior segment, a large flat one covered nearly one half of the ventricular face of the valve. On the endocardium of the ventricle, just below the aortic ring, there was an elevated flattened mass the size of a five-cent piece. Immediately above the right posterior segment, two large grayish-yellow vegetations projected from a slight depression in the wall of the aorta and were in contact with the edge of the valve. A sort of cleft separated the two masses, and when probed, was found to lead into a saccular pouch the size of a large marble, from the edges of which the outgrowths arose. The walls of the small aneurism were thin, composed chiefly of the adventitia, and had lost the appearance of an arterial coat. The interior of the arch was smooth, with the exception of two small patches of superficial atheroma. Two and a half centimetres above the valves the arch measured 8.5 cm. in circumference. At the junction of the ascending and transverse portions, about 1.5 cm. from orifice of innominate, there was a circular opening the size of a fifty-cent piece, leading into a saccular aneurism, the size of a small apple, which projected to the right side and was partially enclosed in the pericardium. The edges of the opening presented large fungoid vegetations, attached to the margin of the intima, and projecting in some places as much as 1 cm. The sac contained blood and recent clots, but no laminated fibrin; the walls were exceedingly thin, in places quite translucent. The vegetations at the edge of the orifice extended upon the inner surface of the sac, covering it in at least half its extent, and in places infiltrated the entire thickness of the wall, so that the peculiar greenish-yellow color of the growth could be observed from the outside. In the wall of the aneurism, just within the line of attachment of the pericardium, there was an irregular laceration 1.3 cm. in length. On the intima of the ascending portion, just below the margin of the aneurism, were two small warty outgrowths which, when carefully examined, were found to spring from the edges of small lacerations or losses of substance, behind which were two aneurismal pouches, about the size of large peas, the walls thin and formed chiefly of the adventitia, which appeared dissected away for a short distance around the narrow break in the internal and middle coats. In one the vegetation extended

round the edge of the orifice upon the outer surface of middle coat, and into the angle between it and the adventitia.

Lungs crepitant in anterior parts; bases heavy and sodden; on section much blood and serum escaped. The left lower lobe was firm, almost airless, but had not a granular appearance on the cut surface.

Spleen weighed 560 grammes; pulp very soft; two small yellowish-white infarcts, tolerably firm and surrounded by deeply congested tissue.

Kidneys not enlarged; the right organ contained one small yellowish infarct.

Stomach and Intestines presented nothing of note; no ulceration in small bowel, or enlargement of Peyer's glands.

Brain. Meningeal hemorrhage beneath arachnoid, chiefly on the right side, upon the sphenoidal convolutions and along the fissure of Rolando; it was thick enough to obliterate the outlines of the convolutions. On the left side there was a thin extravasation over the second and third frontal and upper half of the ascending parietal convolutions. No lesions of the vessels were found; substance healthy..

CASE 6.—*Fractured legs; pneumonia; ulcerative endocarditis; meningitis.*

Unfortunately, the notes of this case have been mislaid, and I am only able to give a brief summary. The patient, a young woman aged 19, jumped from the third story window of a hotel, during a fire, and sustained a double Pott's fracture, and fracture of lumbar vertebræ. She seemed to be doing very well for about a week, when the temperature rose and she complained of pain about the heart and shortness of breath. A systolic murmur in the mitral area was detected. She became exceedingly weak and prostrated, blood appeared in the urine, and she died sixteen days after admission.

At the autopsy, there was no suppuration about the fracture. The *lungs* were engorged with blood posteriorly, and the lower part of right upper lobe and contiguous parts of middle and lower lobes were hepatized. The *heart* was not enlarged; on the anterior curtain of the mitral valve was a large endocardial outgrowth, involving the anterior part of the valve and extending on to some of the chordæ tendinæ; a blood clot was adherent to it, but its surface did not seem broken. A small infarct in *spleen*, and two

in *kidneys*. There was purulent infiltration in the sulci, beneath the arachnoid on the cortex of the *brain*, chiefly on the parietal and frontal lobes; none at the base.

In the *cæcum* and ascending *colon*, were eight or ten superficial patches of membranous colitis, the exudation grayish-yellow, thin, and situated upon injected mucosa.

This case comes, doubtless, under the second class, in which the endocarditis appears to follow some injury or wound. In going over the literature of the subject, I noticed the reports of a considerable number of cases of this kind. Dr. Peabody's case, the autopsy of which I witnessed, resembled this in all its essential features. I should like to remark here that the endocarditis in many cases of this class is a secondary and subsidiary phenomenon in septic infection. Thus, in acute necrosis and in puerperal septicæmia, it is sometimes present, sometimes absent, and the fatal effect and malignancy of the affection does not appear dependent upon it.

CASE 7.—*Sclerotic endocarditis of aortic valves, with incompetency; recent vegetations (ulcerative endocarditis).*

Annie M. L., aged 40, admitted Nov. 23d under Dr. Ross.

No history of acute rheumatism. For five or six years has suffered with shortness of breath on exertion. For the past year health has been failing, and she has had a troublesome cough. For three months has been confined to bed; dropsy has gradually come on, and for three weeks past spitting of blood. Her condition on admission was that of a patient in the advanced stage of obstructive heart disease,—great dropsy of legs, right hydrothorax, dyspnœa, lividity, cough, and bloody expectoration. A double aortic murmur was determined. She only lived for a little over two days after entering the hospital. The temperature was normal.

At autopsy *heart* was large, chambers full of dark clots. Mitral valves healthy. Left ventricle dilated and hypertrophied. The aortic orifice was blocked with vegetations, and when slit open the valves were found much diseased; all the curtains were thickened, curled at the edges and foreshortened. On the ventricular faces were large grayish-yellow vegetations, closely adherent, but friable and roughened on the surface. In one mass the deposition of salts of lime had taken place on the outer part. Large patches of apoplexy in the *lungs*. No infarcts in *spleen* or *kidneys*, which were large and indurated.

This is an illustration of the third class, and perhaps such instances furnish the large proportion of the cases which go under the heading of ulcerative endocarditis.

General and microscopical characters of the vegetations:

With the exception of the specimens from * Case 1, the outgrowths on the valves presented the well-known appearance of the so-called diphtheritic endocarditis. There are one or two points in connection with their general character to which I wish to refer. The term *ulcerative*, as I remarked before, is in certain instances a misnomer. The vegetations on the valves in Case 6 presented a smooth surface, neither granular nor broken, and there were no signs of separation at the attached border. One or two writers have remarked upon this, especially Gray, of Oxford.* Usually, however, the surface of the vegetations is roughened in places, and the friable stroma exposed; and of course if the entire mass were removed there would be an ulceration or even perforation of the valve. We do not know much about the beginning of the process, but it may be that the ulceration comes first, and the thick vegetations represent subsequent formations in the exposed surface.

About the vegetations in Cases 2, 3, and 4, there was a peculiar greenish-gray color, especially marked when they were broken. It was common to meet with a blood clot adherent to the masses, and frequently a thin superficial extravasation beneath the outermost layer of the vegetation.

In Case 1 the vegetations were firmer, not so friable, and had rather the characters described as verrucose.

In Case 5 the outgrowths on the aorta and at the margin of the larger aneurism were soft, of a light grayish-yellow color, and the term "fungoid" best expresses their general appearance. The valvular outgrowths in Case 7 presented

* *Med. Times and Gazette*, 1874.

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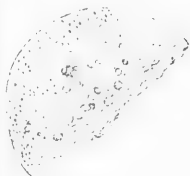


Fig. 2

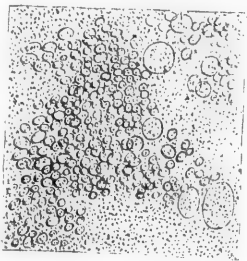
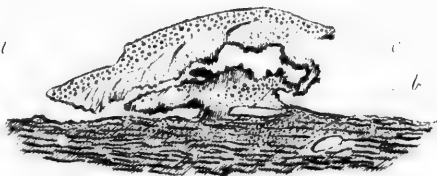


Fig. 4

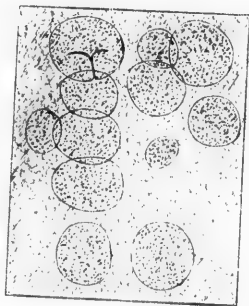


Fig. 5



Fig. 6

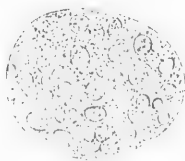


Fig. 7



Fig. 8

the same general characters as in the other specimens, except in the slight calcification at one part.

The microscopical characters of the vegetations in Case 1 offer many interesting features. In the study of this specimen we will begin with the description of small outgrowths. Fig. 1 represents the section of a small wart-like excrescence on the wall of the right ventricle. It is mushroom-shaped, measures 3 mm. across, and springs from the endocardium by a small pedicle. There is no special change in the heart muscle immediately below it (*a*). At the site of attachment the subendothelial tissue is thickened, and contains in the deeper part many nucleated corpuscles imbedded in an indifferent matrix, while in the more superficial part it is distinctly fibrillated, and large elongated corpuscles occur. The vegetation is attached directly upon the fibrillar layer, with the intervention of a thin stratum of round and elongated cells. At *b* in the figure there appears to be an additional base or stalk, and here the proliferation of the subendothelial elements was very marked. The pedicle itself is composed of closely aggregated corpuscles of the size and general appearance of white blood corpuscles. The material in which they are imbedded is granular; fibrils cannot be detected. An irregular break, probably the result of manipulation, occurs about halfway across the mass. At the edges of this (*c*) the colorless cells are thickly set and are stained deeply. The stroma of the mass is made up of a dense fibrin meshwork, only seen with a high power and in a thin section. It is variously interspersed with cells; from some places they are entirely absent. Toward the surface the fibrin assumes a stratified disposition, and the corpuscles are less numerous (Fig. 2).

A short distance from the pedicle, ball-like masses are seen imbedded in the fibrinous stroma, and at the superficial part of the mass similar bodies are very numerous and

constitute the most remarkable feature in the entire texture, Fig. 1, *d*; Fig. 2.

Many of the tendinous chords passing from the tricuspid curtains were thickly encrusted, and sections afforded a good view of the general arrangement of the parts. In a section of such an encrusted tendon, 6 mm. across, there can be seen the tendon in the centre, 1.5 mm. in diameter. Under the microscope it does not appear much altered, and it is only at the periphery that there is any nuclear increase; outside of this is a layer devoid of cell elements, finely granular, and in places laminated. In logwood this part does not stain so deeply. In it are remarkable micrococcus balls, some of large size and isolated, others smaller and closely aggregated together (Figs. 4 and 5). External to this layer and separated from it by a small amount of granular matter is a narrow zone of fibrinous tissue, in which elongated corpuscles are very abundant. It looks as if this was the outer part of the tendinous chord, and as if the layer just described had developed beneath the subendocardial tissue. The external part, comprising the greater portion of the section, is made up of a fibrinous matrix, containing leucocytes scattered through it; most abundant in certain areas. The outermost part of the encrusting mass is distinctly laminated, and contains very few corpuscles, but is thickly set with micrococcus balls, and the tissue has a darkly granular appearance. Fig. 3 shows the stratified appearance and the spherical bodies which here form a nipple-like projection, and appear as if passing toward the surface. This appearance is by no means infrequent.

In the larger outgrowths the chief mass is composed of a nucleated fibrillar tissue, while in the superficial parts there are fibrinous lamination and numerous micrococci colonies. Capillary blood-vessels penetrate the deeper parts of the large masses, and along many there is a deposition of

brown-red pigment. In some sections large micrococcus balls were met with 4 or 5 mm. from the surface.

The most remarkable structures in this specimen are the rounded bodies represented in Figs 1 to 6, and which have been spoken of above as micrococcus balls. They vary very greatly in size; the majority of those in the specimen from which Fig. 1 was taken measured from 0.15 to 0.375 mm. Many are not more than .0075 mm., while at Fig. 6 one is shown which measured .1500 by .1125 mm. In places they occur in hundreds, closely set together, and often very small, as at Fig. 4. The outlines are sharply defined, but it is not certain whether they possess a definite membranous investment. They contain minute refractile granular spherules, which behave with reagents like micrococci. In some of the larger balls, as shown in Fig. 6, secondary ones can be seen.

I am not prepared at present to discuss the nature and affinities of these structures, but hope to do so on another occasion, when I shall enter more fully into the histology of the primary and secondary lesions of this disease.

The vegetations in the other cases may be finally spoken of together, as, histologically, they presented the same features, with a few slight variations. A section through the grayish-yellow material composing the outgrowth has an appearance as represented at Fig. 7,—groups of granular bodies separated by an indifferent tissue. These colonies are usually closely compressed, and form rounded or tubular structures.

In the specimen from which Fig. 7 was taken, the groups measured from .050 to .125 mm. in diameter. In the outgrowths from the aorta in Case 5 this arrangement in colonies was particularly marked, and there were sharply-defined bodies, which bore a close resemblance to the micrococcus balls of Case 1, even to the occurrence of secondary spheres

within them. In a section through the entire thickness of an outgrowth from the mitral valve, 7 mm. in diameter, the following appearances were presented: At the site of attachment there was moderate proliferation of the endocardial tissue, as shown by numerous round and elongated corpuscles, which stained deeply in logwood. The greater part of the thickness of the mass is made up of irregular groups of dark granules, separated by indistinct fibrinous bands. The arrangement is not so uniform as that represented at Fig. 7. In the superficial parts the texture is lower, the fibrinous laminæ more distinct, and the corpuscles much more abundant. A collection of red blood corpuscles exists just beneath the outermost layer of this fibrin.

I do not propose to make any further remarks upon the special clinical features of these cases, none of which came under my care. My attention, however, has been directed to several circumstances in connection with the disease, which have not, so far as I know, received attention at the hands of writers on the subject.

First.—The fact that *primary infectious endocarditis* in the majority of cases does not occur in connection with acute rheumatism, as is almost universally stated to be the case. I have gone over the reports of 57 cases of this kind, and in only 15 is there any mention either of *acute rheumatism* or of previous rheumatic attacks, *i. e.*, in 26.3 per cent. I have not been able to make an exhaustive review of the literature of the subject, but have gathered the cases from the British and American journals, transactions, hospital reports, and from some of the recent French and German journals. I have excluded those due apparently to septic infection, as from whitlow, urethral laceration, acute necrosis, and the puerperal condition. Nor have I included those instances described as ulcerative endocarditis in chronic valvular affections (with dropsy, etc.), class 3 of above

division, often accompanied with aneurisms of the valves; but it may be mentioned in this connection that Dr. Ogle, in the ninth volume of the "Transactions of the Pathological Society of London," gives 21 cases of aneurism of the valves from ulcerative endocarditis, and of 18 of these cases in which a history is given, 15 are distinctly stated not to have had rheumatism. Kirkes,* the pioneer in this department of pathology, noticed the fact of its independent occurrence. I confess to having been considerably surprised at the result of this investigation, as I was previously of the opinion, expressed so strongly by Rosenstein† and others, that the great majority of the cases were met with in connection with acute rheumatism.

The second point to which I wish to direct attention is the frequency with which this disease occurs with pneumonia. Naturally, I regarded it as not a little remarkable that in five cases in succession I should meet with this combination. Cases 2, 3, 4 and 5 appear to have set in with the symptoms of ordinary pneumonia. In Case 6 it did not develop until after the patient had been in hospital for some days. In all, the disease appeared to be of the primary lobar form. In Cases 3, 4 and 5, at the time of the autopsy, the stage of hepatization had passed and resolution had begun. Of 21 cases of primary infectious endocarditis recorded in the "Transactions of the Pathological Society of London," hepatization of the lung is mentioned in 10 as a concomitant pathological condition. Of the 57 cases which I have analyzed, 22 were complicated with or occurred in pneumonia, *i.e.*, 38.5 per cent. What is the nature of this connection? Is the inflammation of the lung a complication of the endocarditis, or *vice versa*? In most of the cases it is distinctly stated that the lung was hepatized, and in

* *British Medical Journal*, 1863.

† *Ziemssen's Cyclopaedia*, vol. vi.

the majority of the instances the disease appears to have begun, as in Cases 3, 4 and 5, with the symptoms of ordinary pneumonia, so that the conclusion naturally suggests itself that the endocarditis was either secondary to the pneumonia or excited by the same cause, which latter I think the more probable supposition. Endocarditis is scarcely mentioned as a complication of inflammation of the lungs. In Huss' statistics * there are only 4 cases mentioned out of 959. Still, I was not altogether unprepared for the occurrence of the so-called diphtheritic inflammation in other organs in pneumonia. Bristowe † was, I believe, the first to point out that diphtheritic colitis was by no means infrequent in this disease, having met with it in 2 out of 30 cases of secondary and 4 out of 16 cases of primary inflammation of the lungs. I have also had my attention directed to this complication, though I have not met with it so frequently as Dr. Bristowe; still of some 40 autopsies in lobar pneumonia, of which I have notes, diphtheritic colitis occurred in 4, usually in the form of thin grayish-white patches, but in one case ‡ there were large, thick, rupia-like masses involving the entire thickness of the mucosa. It is exceedingly interesting to note that in Case 6 this condition of the colon occurred with the pneumonia and endocarditis. Litten § gives a case of ulcerative endocarditis accompanying diphtheritic colitis. The condition of the inflamed part of the lung in these cases did not present any coarse or microscopical differences from ordinary cases. There were no micrococci in the air-cells, nor any appearances resembling the remarkable bacteritic pneumonia described by Delafield. || It is not very evident wherein the

* Quoted by Wilson Fox in Reynolds' System of Medicine.

† Path. Society Transactions, Vol. viii.

‡ Pathological Reports, Montreal General Hospital, No. I, 1878.

§ Quoted in *Brit. Med. Journal*, Sept. 7, 1878.

|| Studies in Pathological Anatomy, Page 65, Pl. XXXV.

connection lies between these affections, but the very considerable number of instances in which they occur together is against a simple accidental complication.

A third point of clinical interest is the occurrence of meningitis in these Cases as in 2, 3, and 6. In the 57 cases which I have analysed this is mentioned as present in 13; *i.e.*, 22.8 per cent. In 7 it occurred with pneumonia. Meningeal hemorrhage, as in Case 5, is mentioned several times. It is probable that the meningitis is embolic, though I have not found micrococci in the exudation. Meningitis is a very rare complication of pneumonia and may occur apart from endocarditis; but in a case of inflammation of the lungs, particularly if the apex is involved (in 3 out of 4 such instances I found the upper part of the lung affected), the development of an irregular temperature with cerebral symptoms should suggest the possibility of endocardial mischief, with secondary meningeal inflammation. The exudation in the meninges in these cases is lympho-purulent, not very extensive, and generally on the surface of the hemispheres, not basic.

The presence of multiple aneurisms of the aorta in Case 5 is deserving of comment, as I have not been able to find any similar observation in the literature of either ulcerative endocarditis or of aneurism.

The man had evidently been the subject of that peculiar congenital malformation of the aortic semilunar valves which results in the fusion of two segments. In this condition they are very liable to be the seat of a sclerotic endocarditis which terminates in incompetency; and I have met with two other cases in which the united curtains, when in this state, were the seat of extensive ulcerative endocarditis.* The cardiac affection was evidently of old standing, and in

* On fusion of two segments of the aortic valves. *Mont. Gen. Hosp. Reports*, Vol. I, 1880.

February, 1879, a year and four months before his death, hypertrophy, a double murmur and a thrill were noted. The interest of the case centres in the four aneurisms of the arch, their age, and method of production. There can be no question of the recent character of the three small dilatations, but in the case of the large one there is room for doubt. Could it have been formed during the five weeks of his last illness, or was it of old standing, and was the thrill heard in February indicative of its presence? I incline to the belief that it was of recent origin for the following reasons:—1st. The character of the sac-wall, which was thin, in places translucent, looking like the stretched adventitia. In a very considerable number of aortic aneurisms of all sizes which have come under my observation, I have never seen one of this size with such a thin sac-wall and without any attempt at condensation. The internal and middle coats were not prolonged into the aneurism. 2d. The absence of laminated fibrin in the sac. Such a narrow-necked aneurism, if it had lasted for many months, would certainly have showed signs of the deposition of fibrin, which takes place in aneurisms quite as small and less sacculated. 3d. The condition of the intima of the arch. Apart from these aneurismal dilatations the lining membrane was remarkably free from degeneration, particularly when we consider the hypertrophy of the left ventricle which must have existed for some time. There was an entire absence of that *endarteriitis deformans* which has, in my experience, been invariably associated with multiple aneurisms of the arch. 4th. A study of the four aneurisms shows that they have essentially the same characters and differ only in size. There is loss of substance involving the intima and media, the edges are covered with fungoid vegetations, and there is saccular distension of the adventitia, the only difference being that in the smaller aneurisms the breach of continuity

is slight, and the vegetations so luxuriant that they completely cover it. Whatever the essential nature of the so-called *ulcerative endocarditis* may be, I think there can be no doubt that in this instance we have to deal with an identical process in the arterial tube, which has caused loss of substance and subsequent dilatation, just as it does on the mitral or aortic valve with the production of valvular aneurism. If this be granted, Case 5 adds an interesting section to the etiology of aortic aneurism.

With regard to the intimate pathology of this disease, it is assumed by most recent writers to be a mycosis, *i.e.*, to be dependent upon the growth and propagation of lowly fungi on the valves with a consequent blood contamination. Certainly the minute bodies found in the endocardial vegetations correspond in their chemical and microscopical relations to micrococci. They are motionless, highly refractile spherules, less than a micro-millimetre in diameter, arranged in groups or colonies without any perceptible stroma. Acids, alkalies, ether and chloroform have no effect upon them. These characters are supposed to afford satisfactory means for distinguishing them from granular detritus of an albuminous or fatty nature. Most writers have accepted the view that these bodies are fungoid in nature. Heller,* however, criticizes strongly the prevailing conceptions with regard to micrococci, and thinks that there are scarcely any micro-chemical agents or physical signs by which they can be distinguished from fatty detritus. He recommends soaking the tissue in 10 per-cent. potash solution and then in iodine solution, 1 in 10 of spirit, which tints monads yellowish-brown, but is inert on fat granules. Sections of the vegetations in these cases, treated in this way, show the colonies stained of a brownish-yellow color.

* *Virchow's Archiv.* lxii, 1875.

Apart from any micro-chemical tests there are peculiarities about these masses which we do not see in any form of fatty degeneration, as the uniformity in size of the granules and their collection into large groups.

The question of the relation of the micrococci to the disease presents many difficulties, and we are probably not yet in a position to give a final answer to the problem. Klebs, and most German writers on the subject, give an unhesitating assent to the parasitic theory and suppose the micrococci to gain access either through the gastro-intestinal or respiratory systems, and they believe them to constitute the actual *materies morbi*. According to Koster* and Klebs† not only are these fungi present in the so-called ulcerative form, but they also exist in, and cause the development of, the ordinary warty or bead-like vegetations so frequently met with in the valves. Within the past few months I have examined four specimens of this variety of endocardial vegetation, and have been able to determine in each instance the presence of micrococci, not, it is true, in the same luxuriance, or arranged in definite colonies, but still sufficiently distinctive. In one case of mitral stenosis a fresh vegetation, when teased, showed many closely-packed spherules, some of which were, as Klebs has remarked with reference to the micrococci in this variety, larger than those met with in the ulcerative form. I was greatly struck with the resemblance which certain of these bodies, in this instance, bore to the individual elements of Schultze's granule-masses—those peculiar granular clumps common in blood of some animals and of impoverished persons. These structures are usually regarded as the *debris* of colorless blood corpuscles, but I have shown‡ that they are aggregations of discoid bodies,

* *Virchow's Archiv.*, Bd. lxxii.

† *Archiv für Exper. Pathol. u. Pharmacol.*, Bd., ix,

‡ Proceedings of the Royal Society, 1873.

probably living organisms of the nature of which we are still ignorant. They do not exist in the form of masses in the blood, but as isolated particles which might readily become adherent to the fresh endocardial outgrowths. I merely mention this as a point worthy of future investigation.

It matters little how the micrococci get to the valves, whether by embolism of the small vessels, as Koster supposes, or by deposition on the surface, as Klebs thinks; the question is: Are they responsible by their growth for the peculiar course and malignancy of cases of infectious endocarditis, primary or secondary? The facts of their occurrence in the verrucose form, which may not be accompanied by any symptoms, and of their abundance in the recurrent endocarditis, which attacks old sclerotic valves, are, I think, opposed to this view, for if they act as a septic poison in the one case, why should they not do so in the other? The micrococci do not appear to infest the blood in any numbers, so that they must be supposed to distil some subtle poison, "such soon-speeding gear as will disperse itself through all the veins" and profoundly disturb nutrition. The occurrence, however, of fatal septic cases, closely allied to, or identical with those in which a bacteric endocarditis is found, but in which no micrococci can be detected, either in the local process or in the blood, teaches us that the same poison may exist without the intervention of bacteria, the presence of which in any case may be only a partial phenomenon in a general infective process.

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merely details we have
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Flint refers to cases of
"Primary Sarcoma" (Pract. & Med. p. 389. 5th Ed.)
"beginning in one group of
"glands and forming metastas-
"ases in various parts
"of the body but not by preference
"in other Glandular tissue"
I do not see that Flint
has in the Practice given
any detailed account
of this form of Sarcomatous
(disease)

men - a case of death
has been reported to
our office C. H. ... where
a man, aged 53 after a
illness of 2 or 3 years
from enlargement of the cervical
& inguinal glands - and it
was said that both the cervical
glands were enlarged - the right
protruding $\frac{1}{2}$ an inch and
appears to have been excised
and there was a loss of sight
of that eye - there are the
(unray)

the man died at age 54 after an operation
for cancer of the neck. Said to have been 100 years

CASES OF HODGKIN'S DISEASE.

By WM. OSLER, M.D., M.R.C.P., LOND.

Professor of the Institutes of Medicine in McGill University, and Physician
to the Montreal General Hospital.

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There is at present a tendency among certain writers to the belief that the various diseased conditions of the lymphatic glands are so related as to form a pathological series, the members of which may pass the one into the other. Thus Dr. Goodhart, of Guy's Hospital, says: "We find the following conditions of the lymphatic glands all closely related to each other: First there is a local chronic inflammation (the so-called scrofulous gland); next a local simple tumour, called by some hypertrophy; lastly a local malignant tumour, some varieties of which are called by some lymphatic cancer. These are all *local*. But there is also a parallel series of generalized affections, a diffused chronic inflammation or scrofulous state, a diffused or general simple tumour, a generalized malignant tumour, and with the exception of the scrofulous or caseous group . . . and perhaps of the generalized malignant tumour, these various conditions can be shown upon very good clinical, if not pathological evidence, to lead the one into the other." However this may be, the cases characterized by a certain set of clinical features have been conveniently grouped together, and are described under the various names of *Hodgkin's Disease*, *Anæmia lymphatica*, *Adénie*, *Pseudo-leukæmia*, &c. The distinctive features of this affection are: gradual enlargement of groups of lymphatic glands, gene-

rally also of the spleen, disseminated lymphatic growths in the viscera, and anaemia with more or less cachexia. To the morbid process in the glands, the names of Lymphadenoma, Lymphosarcoma, Malignant Lymphoma, Desmoid Cancer, &c., have been given, and they indicate the diversity of opinion that prevails with regard to the nature of the growth. In the majority of instances, perhaps the term lymphadenoma is applicable, as the enlargement is due to an increase in the normal tissues of the gland, though the relation between the constituent elements is scarcely maintained so closely as in simple hypertrophy from irritation. In other cases the growth resembles an actively-growing sarcoma, and may involve contiguous tissues, or even infect distant organs. The following cases illustrate many of the chief features in the clinical history and morbid anatomy of the disease :—

CASE I.—*Lymphadenoma of the Retro-peritoneal glands—Enlargement of the Spleen—External Glands not affected.*—C. C., an immensely stout man, aged 40 years, first complained in May, 1876, of severe pain in the lumbar region. It evidently followed the course of the lumbar nerves, and there was tenderness over the same parts. This was called and treated as lumbar neuralgia, which it certainly was. There was at this time no alteration in the general condition of the patient, who maintained his usual appetite and strength. Some months later, and after the lumbar pain had continued with varying intensity, other symptoms occurred. Pains were felt down both legs, but more especially the left, and occupying mainly the anterior aspects. He began to feel weak and to lose flesh, and the pulse became soft and habitually rapid. The loss of weight was neither rapid nor excessive, but his muscles became soft and flabby, and he kept throughout an enormous corpulency of abdominal fat. After this a new direction of pain was experienced, viz., along the left spermatic cord, sometimes very severe. Then chills appeared ; these occurred at irregular intervals, sometimes slight, but at other times amounting to well-marked rigors. After these, the temperature would be quite high, 100°F. to 104°F. and during the interval, though much lower, it was nearly always a degree

or more above the *norme*. Diarrhoea set in, and obstinately resisted the use of astringents and other remedies. Exhausted by the very severe pain, which constantly required hypodermic injections of morphia for its relief, by the diarrhoea, which was generally copious, by the fever and by colliquative sweating, he gradually sank and died, 1st March, 1877. The case was certainly one in which it was extremely difficult to arrive at a positive diagnosis. The opinion held during life was that there was either deep-seated abscess in the abdomen (peri-nephritis?) or that malignant disease occupied the deep abdominal glands and pressed on the lumbar nerves. The former seemed the more probable explanation, being favored by the rigors, fever, sweatings and diarrhoea in the later stages. The autopsy alone revealed the true nature of the case—lymphadenoma of the retro-peritoneal glands, there being also a large spleen. This condition was not suspected during life, which will not be wondered at when the extreme rarity of such an occurrence is considered, and the fact that there were no enlargements whatever in the external parts which might have led to a suspicion of similar trouble in the corresponding internal lymphatics. It should be said that the extreme corpulency of the patient quite precluded the possibility of recognizing a moderate enlargement of the spleen. The blood was not examined. It is doubtful if, even had this been done, any material assistance would have been rendered in the diagnosis.

Autopsy, 24 hours after death.—Body that of a large-framed, somewhat corpulent man. Abdomen large; no œdema of legs. Skin very pale. External lymph glands not enlarged.

In peritoneum, about 30 ozs. of turbid serum; intestines of a dark slate-grey colour. In thorax, a few ounces of turbid serum in pleuræ. *Heart* soft, and the sub-pericardial fat is in excess; chambers contain dark blood and clots; valves are healthy; muscle substance very pale, of a yellowish-brown colour.

Lungs are crepitant throughout. No enlargement of bronchial or mediastinal glands.

Spleen is much enlarged, measures 35 cm. in length by 15

cm. in breadth ; capsule is thin ; pulp soft, of a dark purple-red colour ; trabeculae not much developed.

Kidneys : fatty, capsules thick and more fibrous than usual ; organs are large and flabby, cortices swollen ; vessels of pyramids injected ; many of the straight tubules are filled with urinary salts.

Liver not enlarged ; substance pale and looks fatty.

Stomach and intestines present nothing of special note. Peyer's glands not enlarged.

When the intestines were turned out, the chain of lymphatic glands about the aorta and iliac vessels were seen to be greatly enlarged. Beginning immediately below the diaphragm, they extended in a continuous series to the femoral rings, involving the lumbar, sacral and internal iliac groups. They were entirely retro-peritoneal, and the affection was limited to the glands above mentioned, not involving the mesenteric or external iliac. Though in contact, the individual tumours were distinct, and could be isolated. Along the aorta to its bifurcation they were about the size of large walnuts ; close to the lower end of the left kidney there was one the size of a small apple. Four or five large ones were situated on either side of the external iliac arteries. One on the left side lay directly upon the genito-crural nerve ; another on the same side plugged the femoral ring. In the course of the internal iliacs the tumours were not so large. The larger tumours were soft, conveying to the touch the sensation of indistinct fluctuation. The smaller ones were firmer and more resistant. On section, the substance was soft, greyish-white in colour, interspersed with reddish streaks. In the smaller growths the cut surface was consistent, and looked more like the natural gland tissue.

Histological Examination.—Blood taken from the splenic and jugular veins did not show such a marked increase in the number of colourless corpuscles as to constitute leukaemia. *Spleen* : The only points of special note were the number of small lymphoid, colourless corpuscles, and the abundance of large round bodies containing either red blood corpuscles, diffused colouring matter or yellowish granular pigment. I have never seen these struc-

tures so numerous as in this specimen—from four to six could be seen in each field of the No. 9, im (Hartnack). The enlarged *retro-peritoneal glands* consisted of the following elements: (1) Lymphoid corpuscles, very abundant; (2) colourless cells, like white blood corpuscles, about double the size of the lymph cells and with a more granular protoplasm; (3) giant cells; (4) fibre cells of connective tissue. *Heart* muscle was very fatty. Only the marrow of a rib could be secured for examination, and it presented the usual characters of this tissue, but the corpuscles containing red-blood were very numerous.

CASE II.—*Lymphadenoma of the Cervical, Axillary and Thoracic Glands—Large Mediastinal Tumour—Right Hydrothorax—Progressive Anæmia.*

James K., æt. 20, a patient of Dr. Sherman's of Morrisburg, Ont., who brought him to Montreal for examination on June 30th, 1880.

Family history—Parents alive; has brothers and sisters; he is himself a twin; no history of scrofula or other hereditary disease in the family, the members of which appear healthy and well nourished. Father and sons are very hard-working farmers.

Previous history—Has been a healthy lad; never any special illness. Has been a very hard worker.

Present illness—In November, 1879, he caught cold, had a severe chill, and pain in the right side. Did not lay up or have a doctor, but felt unwell for several weeks. About Christmas he noticed the glands on the left side of the neck to be enlarged. There was at the same time swelling of the thyroid. A slight prominence of the upper part of the sternum was noticed in January, and shortly after the glands in the right axilla began to enlarge. About a month ago the left axillary glands became swollen. Under treatment (iron and cod liver oil) the cervical glands diminished in size, and the enlargement of the thyroid disappeared. He has lost flesh, not much since March, and has become pale and short of breath.

Present condition.—Patient is an average-sized young man, fairly well nourished; eyes blue; complexion muddy, particularly

on lower part of the face ; is anæmic, and complains of muscular weakness. Appetite is good ; bowels regular ; tongue moist, indented with the teeth. Pulse 128 ; respirations 55.

On inspection, left cervical glands greatly enlarged, forming a continuous tumour from behind the ear to the clavicle, occupying both anterior and posterior triangles. The individual glands in the collection can be felt, are moveable beneath the skin, of elastic feel, and not painful. On the right side there is no evident enlargement, but the glands can be felt with unusual distinctness, and just above the clavicle they are decidedly enlarged. In right axilla, just within the axillary fold, there is a tumour the size of a couple of billiard balls, and in the left axilla a smaller one ; both are freely moveable, of moderate consistence, and not painful. The inguinal glands are not enlarged.

In front of the chest there is marked bulging of the upper two-thirds of the sternum and corresponding costal cartilages, forming a somewhat flattened tumour, extending from root of neck to level with the nipples, and about six inches in breadth. Its point of greatest prominence is opposite the 2nd rib. The skin over it is natural looking ; there are a few dilated venules. There is no pulsation ; it is painful on pressure, and pits slightly. The glands are enlarged in the epi-sternal pit, and just over the right sterno-clavicular joint are two glands, to which the skin is firmly adherent. In respiration the left side of chest moves more freely than the right, and the intercostal spaces are obliterated in the latter. On mensuration, right, 18 inches ; left, 17½ inches. Apex beat visible 1¾ inches below and 1 inch to the outer side of the left nipple. On percussion, absolute dulness over swelling in front of the chest, extending on the left side as far as the nipple line. Outer part of left infra-clavicular and mammary regions presents a clear note : same on posterior regions of this side. Right side is uniformly dull, except a finger's-breadth beneath the clavicle and in the supra-spinous and upper part of outer scapular regions behind. Tactile fremitus absent over dull areas. On auscultation, breath sounds exaggerated and harsh on left side : tubular at upper part of right lung in front and behind, abolished at base on this side.

Heart is depressed, dulness merges with that of the sternal tumour; impulse forcible; sounds clear.

Abdomen looks full; superficial veins distended; when he stands up they become very marked, are coiled, and in places varicose. Sense of increased resistance in region of navel, but no definite tumour can be felt.

Liver extends two fingers-breadth below costal border, and in sternal line reaches to the navel. It is depressed, not enlarged.

Spleen not increased in size.

Urine is amber-coloured; sp. gr. 1023. No albumen. There is no tenderness over any of the bones.

Blood thin, claret-coloured. Red corpuscles tolerably uniform in size, with regular outlines; a few small ones noticed. White corpuscles appear a little more numerous than normal; no special alteration in size or appearance. No nucleated red corpuscles. With Gowers' hæmacytometer, number of red per cubic millimetre about 2,100,000, = 42 per cent. Proportion of white to red corpuscles, 1 to 180. Percentage of hæmoglobin with Gowers' hæmachrometer, 46.

Diagnosis—Hodgkin's disease (lymphadenoma) with pleuritic effusion on right side.

The young man returned home, and the further history of the case, as gathered from Dr. Sherman, is as follows:—About the middle of July the fluid was drawn out from the right side, 14 pints, straw coloured. This relieved him considerably, and he was able to breathe quite freely. The sternal tumour had increased in size and became inflamed. On July 26th Dr. Sherman opened it at the lower part, about half a pint of ill-conditioned, bloody, pus escaped. Appetite keeps good. On Aug. 9th the lad's father reported that the breathing had again become difficult, and dropsy was beginning in the legs. Death took place on Aug. 20th, rather suddenly, as he had been walking about the barn-yard the same day.

Autopsy, about 40 hours after death, in the presence of, and assisted by, Drs. Sherman and C. E. Hickey of Morrisburg, Dr. Wagner of Dickinson's Landing, Dr. S. Hickey of Aultsville, and Dr. Blackstock of Chesterville.—Decomposition had set

in ; face swollen, skin discoloured and crepitant to the touch. Swelling in front of the chest had increased in size, and at the lower part, the incision above referred to was seen. Cervical and axillary tumours about the same size. On making the preliminary incision, a quantity of soft greyish material escaped from the tumour over the sternum. When cut into, substance soft and pulpy, with harder masses scattered through it. To a level with the 4th rib the sternum was destroyed, only a small bit uniting the clavicles above. The cartilages of the 2nd and 3rd ribs were also eaten away, and on the right side there was erosion of the bony parts as well. There was slight infiltration beneath the pectoral muscles, but the growth was not continuous with that in the axillae. On fully exposing the cavity of the thorax, the entire anterior mediastinum was filled up with soft greyish white masses, lying upon the aorta and pericardium, and extending into the neck. A large rounded mass, firmer than the rest, occupied the position of the right auricle and pushed the heart to the left. Several isolated tumours were attached to the diaphragm. The antero-lateral part of right lung was closely united to the tumour ; on the left side the lung was free, but the growth projected in nodular masses into the pleural cavity beyond the costal cartilages. About four pints of blood-stained serum in right pleura. Entire mass removed with lungs and heart. On dissection from behind, aorta not compressed, though the arch was surrounded by irregular masses. Esophagus presented one or two enlarged glands attached to its lower third. On slitting up the trachea and bronchi, former not compressed, right bronchus free, left somewhat narrowed, a conglomerate mass of enlarged glands surrounded the trachea from the root of the neck to the bifurcation, and passed out the bronchi, particularly the left, and were imbedded in the lung substance. Immediately below the fork of the bronchi was a group of large glands, somewhat firmer than the others.

Heart transversely placed and pushed down ; chambers and valves normal ; arch of aorta crossed at level of 3rd intercostal space.

Lungs—Right collapsed, only the extreme apex crepitated.

Throughout the lower and middle lobes were numerous greyish-white masses, varying in size from a cherry to a walnut. They were very abundant in the fissure between the lower and middle lobes. The left lung was oedematous, otherwise healthy. The enlarged glands at the root penetrated into the substance, but not to the same extent as in the other lung.

Spleen 15 cm. in length, pulp soft, uniform; no nodular masses.

Kidneys presented nothing abnormal.

Liver pale, not enlarged. Nothing special was noticed in stomach or intestines. Peyer's glands not enlarged.

Lymphatic Glands.—The *cervical*, on the left side, formed a large tumour made up of a chain of glands extending from the sternum to the back of the ear. They occupied both triangles of the neck, and the sterno-mastoid muscle was stretched over them. The enlarged glands were closely adherent, about the size of walnuts, and tolerably firm. Many of the smaller ones could be enucleated. On the right side, only the lower cervical glands, just above the clavicle, were affected. The *axillary* glands were much enlarged, forming large bunches, composed of closely packed glandular masses, the individual elements of which were with difficulty separated. *Mesenteric* glands of normal size. *Retro-peritoneal* glands enlarged to the size of horse beans, and firm. One or two in the hilus of liver, also enlarged. *Inguinal* glands not affected. Owing to decomposition, the glands were doubtless softer than during life. On section, they had a greyish colour and a soft cerebriiform appearance; a considerable quantity of juice was obtained on scraping the cut surface. Some of the glands were firmer, and had strands of firmer tissue passing through the substance. One or two of the masses in anterior mediastinum presented in spots a caseous appearance.

The decomposed state of the glands did not allow of a very satisfactory microscopical examination of their tissue, when recent, but hardened specimens showed, on section, closely packed lymphoid cells with a variable amount of fibrous stroma. In several portions of the mediastinal mass the crowded elements had undergone caseous degeneration.

CASE III.—*Lymphadenoma of the Cervical, Axillary and Mediastinal Glands—Progressive Anæmia.*

T. B., aged 20, a machinist, was admitted to Hospital Nov. 20th, 1880. Parents living and healthy. Has four brothers and sisters. He is a twin. There is no consumption in the family, nor have any of the members suffered from glandular enlargements. Had typhoid fever three years ago; does not think he has ever been so strong since. About the middle of last February the glands on the left side of the neck became enlarged, and shortly after those of the left axilla; the latter increased rapidly in size, and got painful. He has lost flesh, and has become pale and weak. Has had a cough for some time.

Oct. 25th.—At this date the patient was sent for examination by Dr. Rodger, of Point St. Charles, under whose care he has been. Appearance that of a pale, thin young man; long face, eyes blue; head elongated in anterior and posterior diameter; forehead narrow, but very prominent. In left cervical region glands in anterior and posterior triangles enlarged, the size of large almonds, and forming a conspicuous swelling. There is an enlarged gland placed directly over middle of left sterno-mastoid muscle. On the right side there is a single large gland in subclavian triangle; the others are scarcely perceptible. In left axilla there is a bunch the size of a small fist, situated anteriorly, beneath the pectoral fold. The separate glands can be distinctly felt, and they are elastic, moveable, and not painful. Right axillary glands were sore at one time, and a little swollen, but are now of normal size. Inguinal glands not enlarged. On inspection of chest, a decided prominence is noticed on left side, over cardiac area, extending beneath third, fourth and fifth ribs, as far out as the nipple line to the left, and to the middle of sternum on the other side. The swelling occupies an area about the size of the palm of the hand. Percussion gives a dull note over the swelling, as high as the second space above, and merging below with the cardiac and hepatic dullness. To the right its limit is about the mid-sternal line; to the left, the nipple line. Over the rest of the chest the percussion is normal. No special alterations in breath sounds.

Splenic dulness not apparently increased. *Liver normal.* Appetite good. Blood not leukaemic ; proportion of colourless corpuscles not ascertained. Weight, 131 lbs. ; in May was 141.

Nov. 21st.—Present condition. Has been at home since last note, in much the same condition, but is now somewhat weaker, and has lost five pounds in weight. Glands in left cervical region have diminished much in size, the enlargement being now hardly visible on cursory examination. On palpation, however, they can be felt, slightly enlarged, hard, and freely moveable. There is one the size of a small walnut, lying directly upon the centre of the sterno-mastoid muscle ; on the right side, there is one in the anterior cervical region, and a couple of small glands over the mastoid process of the temporal bone. The right lobe of the thyroid seems a little larger than the left. In left axilla the bunch of glands formerly described maintains about the same size. He thinks they have been larger, and they have been painful (since last examination.) The individual glands are not distinctly perceptible. The skin over them is not adherent, the whole bunch being freely moveable. Inguinal glands just perceptible.

Thorax and Abdomen.—*Inspection.*—There is a prominence, as formerly noted, in the left mammary region, extending from about the second to the sixth rib, and laterally from the left border of the sternum to the left border of the nipple, and is most prominent in the transverse nipple line.

Percussion.—On the left side there is dulness, from the second rib in the para-sternal line, which is continuous with that of the heart. To the left, the dulness extends for half an inch outside the nipple line. To the right, it extends nearly to the right border of the sternum. Over the upper bone of the sternum, the note, though not absolutely dull, is deficient in clearness. A clear note is obtained over the clavicle, the infra-clavicular, axillary, and posterior regions of the left side, and over the entire right chest. Apex beat can neither be seen nor felt.

Auscultation.—At apices, in front breath sounds appear somewhat weaker on the left side ; behind, scarcely any notice-

able difference. No special difference in breath sounds elsewhere behind.

Liver.—Dulness from lower border of sixth rib, and does not extend below costal margin.

Spleen.—Cannot be felt on palpation. Vertical line of splenic dulness is about three inches. Nothing special on palpation of abdomen.

Heart sounds clear. Region of greatest intensity, just below and a little to the left of the nipple.

Appetite very fair. Bowels regular. *Urine*, no albumen, no sugar. About three weeks ago his voice suddenly became harsh and husky.

Nov. 25th.—Blood examined to-day. Drop of a good colour, not hydraemic. Red corpuscles run together into irregular clumps, and do not form natural rouleaux. They appear of tolerably uniform size, no very small ones are seen. One or two have an irregular outline. Colourless corpuscles are increased to a moderate degree, and many appear smaller than usual, otherwise they have a natural appearance. Schultze's granule masses very abundant. Fibrin fibrils form an unusually dense and clearly defined network. Haemoglobin (with Gower's apparatus), 48 per cent.

Nov. 27th.—Complains of an aching pain in chest, with a focus in mid-sternum, which came on last evening. It is easier to-day.

Nov. 29th.—For three nights the pain has recurred with increasing severity, and last night interfered with sleep. No change otherwise.

Dec. 2nd.—For three days his evening temperature has been up to 102°. Morning temperature, nearly 101°. Is looking considerably paler than when he came in. No change in neck. Tumor in anterior thoracic region looks fuller, slightly flushed, and oedematous. To-day pain is less over the sternum. No change in axillary tumours.

Blood drop of a good colour. White corpuscles seem in greater abundance. Granule masses large and plentiful. Red cor-

puscles per cubic millimetre, 3,550,000. The ratio of white to red is 1 : 185.2. Allowed to go out for exercise.

Dec. 7th.—Left the hospital for his home in the country.

The treatment advised by Drs. Howard and Rodger, of Liq. Arsenicalis and cod liver oil, with nourishing diet, was continued during his residence.

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Obituary.

CHAS. F. A. LOCKE, M.D., C.M.

Many will have heard with deep regret of the death of this gentleman on the 24th, at the early age of 30. He appears to have been attacked with uræmic convulsions, and died after a few days illness; the kidney disease having been latent, and causing no definite symptoms until the sudden and fatal seizure. He was a strong powerfully-built man, of unusual vigor, and when last seen by the writer in September, looked a picture of physical health.

He was born in Barrie in 1850, and entered upon the study of medicine in 1867, at Toronto, proceeding in the following year to McGill College, where he graduated with honors in 1871. Shortly after, he went to Hamilton and entered into partnership with the late Dr. Hamilton, succeeding to the practice on the death of that gentleman. His skill and attention gained the confidence of the public to an unusual degree, and he was in the enjoyment of a large and increasing practice. He was a member of the staff of the General Hospital, and Vice-President of the Hamilton Medical & Surgical Society. In the struggle of professional life as at present carried on, something more than ability is necessary to ensure success; there must be tact, amiability and judgment, and these had been allotted in an unusual degree to Dr. Locke. From his parents he had received some of the finest qualities of our nature—inherent honesty, warm-heartedness, and good temper—qualities which go for so much in this life, and are amongst those inbred characteristics which individualize the man and make him loveable to his friends. Sprung from an Irish family, he had in his youth the impetuosity and dash of his race, and among his fellow students was a universal favorite. The class of '71 have lost the member

who, above all others, contributed to make the hours of relaxation joyous; and many, when they hear of his untimely death, will recall the happy days spent at the old Cote Street School, rendered happier by the friendship of their departed classmate. The lapse of years tempered and subdued the light-hearted student, who could scarcely be recognized in the sober, thoughtful man. His naturally strong character was refined with age, and at the time of his death, in the full vigor of manhood, he presented a bright example of the Christian physician. Of a generous, warm-hearted disposition, with a keen sense of professional honor, he had acquired the friendship of many, the respect of all, of his colleagues. One of them writes: "I have lost in Dr. Locke a professional brother whom I highly esteemed, I may say whom I loved, and whose upright, honest, straightforward, conscientious conduct had gained him hosts of friends. His success was daily increasing. His death is an overwhelming loss to his family and immediate relations, but we know that to die was gain to him, for he was deeply religious, and he leaves behind him a life that we may all well follow;—such a character we seldom meet in one so young." To his patients he had endeared himself by a course of uniform kindness and consideration, no less than by his medical skill. He leaves a widow and two young children, to whom we extend our deepest sympathy in this their great trial.

CLINICAL LECTURE

ON

IDIOPATHIC OR PERNICIOUS ANÆMIA.*

BY WILLIAM OSLER, M.D., M.R.C.P., LOND.,
Professor of the Institutes of Medicine, McGill College.

(Delivered at the Montreal General Hospital in the Summer Session Course, April 14th.)

GENTLEMEN,—The patient before you offers an example of that interesting disease described by Addison, in 1855, as "Idiopathic" Anæmia. Biermer, in 1872, thought he had discovered a new affection, and gave it the title of "Progressive Pernicious Anæmia." Lebert gave to it the name of "Essential," and you will find it described under one of these three terms. Here, in Montreal, we have been made familiar with it by the labours of Dr. Howard, your Professor of Medicine, whose paper, before the International Medical Congress, held at Philadelphia in 1876, was one of the earliest and most important of the recent contributions to the subject. Owing to his kindness, and that of several of my colleagues, I have had opportunities of investigating certain points in connection with the pathology of the disease, particularly with reference to the state of the blood and the bone marrow.†

* Reported by Mr. T. W. Duncan, and revised by Dr. Osler.

† *Canada Medical and Surgical Journal*, March, 1877; *Transactions of the Canada Medical Association*, 1877; *Centralblatt f. d. Medicin. Wissenschaften*. Nos. 15 and 28, 1877, Berlin; *Centralblatt f. d. Medicin. Wissenschaften*. No. 26, 1878.

The history of the case is as follows :—

Thomas W—, aged 47, a well-built Englishman, was admitted under the care of Dr. Ross, on January 19th, transferred to my charge on the 1st of April. He was a bricklayer by trade, but served for twelve years in the army, and was through the Crimean War. For the past two years he has been a baggage-man at the Railway station. He has always enjoyed good health, has never had ague, though he resided for some time in a malarial district. He is a married man, has four children; has not had any special domestic or mental trouble. Up to August, 1877, he enjoyed good health; but about this time he began to feel weak and lost colour. He fainted on several occasions, and had attacks of bleeding at the nose. In January, 1878, he entered the hospital, and remained three months—his symptoms being anæmia, without any recognizable cause, weakness, swelling of the ankles and retinal hæmorrhages. He improved very much, and in a couple of months after leaving the Hospital, was able to work, though pale and weak. Through the years 1879 and 80, he followed his occupation, but never regained his former strength or colour. There appear to have been slight digestive troubles as he had not been able to eat meat.

In August last his wife was confined and was very ill afterwards. Attendance upon her and anxiety brought on the old symptoms, and when he entered the hospital, on January 19th, he was exceedingly weak and pale; had headaches, bleeding at the nose and dizziness when standing. These symptoms have continued with occasional intermission up to the present date. On several occasions the bleedings were severe, lasting once for nearly twelve hours; the blood coming drop by drop from the right nostril. The temperature was usually normal, but at times went up to 101° or 102° . For the past three weeks there has been no hæmorrhage, and his general health has improved, the headaches have disappeared and he takes nourishment better.

His present condition is as follows :—You notice, in the first place, the extreme bloodlessness of the exposed regions, particularly marked in the face; but I would call your attention to a peculiarity in the colour of the skin, which is

well marked in this case, and has been so in all of the cases which I have seen in this city. It is not blanched from simple bloodlessness as in the pallor of fear or hæmorrhage; but there is a peculiar sallow, dirty yellow or lemon tint, not the hue of jaundice, and, moreover, the conjunctivæ are not stained. It is also quite distinct from the greenish yellow tinge of the skin in chlorosis. The patient still has a fair amount of subcutaneous fat, though he has lost a good deal of flesh in the past three years. He is weak, easily tired, and it has been as much as he could do to get from the ward to the lecture room. His breath is short on exertion, and he feels faint and dizzy, when he stands for any time. The appetite is poor and the digestion weak, but he has never had vomiting. The bowels are regular, no diarrhœa. Pulse is 84 per minute, soft and weak. On listening to heart sounds, which are very distinct, there is a blowing systolic murmur at the base, evidently hæmic in character, and the venous hum is loud in the neck. There is no evidence of any pulmonary trouble. The examination of abdomen is negative; liver dulness, normal. Spleen dulness, about four inches in vertical diameter, edge cannot be felt under the ribs. Urine clear, reaction acid, sp. gr. 1015. There are no cerebral symptoms; he has suffered from headaches, but not latterly. On examination of the eyes, retinal hæmorrhages are seen, and also pigmented spots, the result of old extravasations.

The examination of the blood yields the following results: With Gower's Hæmacytometer, red corpuscles per cubic millimetre, 970,000, 19·4 per hæmic unit, instead of about 5,000,000 in the c. m. The hæmoglobin, as estimated by Gower's Hæmachromometer, is only 20% of the normal, and about the same percentage is obtained by Quincke's apparatus. The blood drop, when expressed, has not the full rich colour and consistency of normal blood, but is paler, thinner and watery. Under the microscope, the corpuscles show a great inequality in size, some are larger than normal, others very much smaller. Many are very irregular in outline. The colour of individual corpuscles is pretty good, a few nucleated red corpuscles exist. The white corpuscles are not materially increased, the proportion, when counted, 1 to 230 red. There is an entire absence of

Schultze's granule masses, so common in the blood of debilitated individuals. I have put, for purposes of comparison, the blood of an anæmic girl under another microscope and you will be able to perceive a marked difference. Summing up the chief symptoms, we have,—

1. Profound anæmia without any obvious cause.
2. Cardiac and vascular murmurs.
3. Repeated attacks of epistaxis, which began originally after the anæmia was established.
4. Retinal hæmorrhage.
5. Peculiar alterations in the histological character of the blood.

The clinical picture which Addison has left of the disease is unequalled, as you may gather from the following extract:—
 “It makes its approach in so slow and insidious a manner, that the patient can hardly fix a date to his earliest feeling of that languor which is soon to become so extreme. The countenance gets pale, the whites of the eyes become pearly, the general frame flabby rather than wasted; the pulse, perhaps, large but remarkably soft and compressible . . ; there is an increasing indisposition to exertion with an uncomfortable feeling of faintness, or breathlessness on attempting it; the heart is readily made to palpitate; the whole surface of the body presents a blanched, smooth, and waxy appearance; the lips, gums and tongue, seem bloodless; the flabbiness of the solids increases; the appetite fails; extreme languor and faintness supervene, breathlessness and palpitations being produced by the most trifling exertion or emotion; some slight œdema is probably perceived about the ankles; the debility becomes extreme.”*

He says that these were “cases in which there had been no previous loss of blood, no exhausting diarrhœa, no chlorosis, no purpura, no renal, splenic, miasmatic, glandular, strumous, or malignant disease.”

Of the individual symptoms of the affection, I shall not speak fully, as most of them are common to all forms of anæmia, but one or two demand special attention. I have already told you of the state of the blood in this patient, and of the remarkable diminution in the red corpuscles. Instead of 5,000,000 to the

* Addison's Works, New Sydenham Society, p. 212.

cubic millimetre, the number is reduced to 970,000. In over fifty cases of diseases, accompanied with wasting, in which I have carefully counted the corpuscles, pernicious anemia is the only one in which I have met with a reduction in the red corpuscles below 1,000,000 to the cubic millimetre. Even in an instance of severe hemorrhage—hemoptysis extending over a week—and during which time the man lost nearly ten pounds (by measurement) of blood, the number of corpuscles was 1,390,000 per cubic millimetre. The reduction may be much more marked than in this case; the most striking instances which I have found recorded are given by Quincke,* in one, 330,000 per c. m.; and in another, 143,000 per c. m.† Strange to say, this patient recovered after transfusion, and the number of corpuscles rose from 143,000 on the 22nd of May, to 1,334,000 per c. m. on the 5th of August.

The colour of the blood is much altered; the drop, as expressed from the finger tip, has not the rich red tint of health, but is lake coloured or like claret and water. In some forms of anemia, particularly chlorosis, the hæmoglobin is greatly reduced, even when the number of red corpuscles maintains a fair standard. Thus, in two cases of chlorosis, while the globular richness was 87·8 and 92 per hæmic unit,† respectively, the hæmoglobin, as estimated by the hæma-chromometers of Quincke and Gower was 64, and 66 per cent.; that is to say, the individual corpuscles were poor in colouring ingredients. In pernicious anemia, the loss in colour is usually proportional to the corpuscular poverty as in this case, in which the red corpuscles are only 19·4 per hæmic unit, and the hæmoglobin 20%.

The microscopical characters of the blood in this disease are worthy of your closest attention, as I know of no disease in which that remarkably constant histological element, the red blood corpuscle, undergoes such important modifications. I have

* *Archiv. f. Klin. Medicin.* Bd. xx., 1877.

† "With normal blood the average number of corpuscles in two squares of the Hemacytometer (containing '00002 cubic millimetres of blood is 100). I propose, therefore, to take this volume of blood, '00002 c. m., as the standard volume, and to term it "hæmic unit." Thus the number of red corpuscles per hæmic unit is the percentage proportion to health." (Gowers)

studied carefully the blood in six instances of the disease, and in all there has been a striking uniformity in the microscopic features, which are as follows:—

1. Remarkable variations in the size of the red corpuscles, three sorts being distinguishable; (a) Giant forms; usually not very abundant. I have measured some of these as much as $\frac{1}{1700}$ and $\frac{1}{1800}$ of an inch in diameter. (b) Medium-sized cells, such as ordinarily met with; they constitute the larger proportion. (c) Very small corpuscles—microcytes—tolerably numerous; they are globular, and of a deep colour; they range in diameter from $\frac{1}{7000}$ to $\frac{1}{8000}$ of an inch.

Quinke has coined a term to express this great discrepancy in size, Poikilocytosis.* It is certainly a remarkable feature in the blood of this disease, and though not absolutely peculiar to it, yet, is much more marked, in my experience, than in leukæmia, splenic anæmia and Hodgkin's disease.

2. Great irregularity in the form of the corpuscle. The disc shape of the red blood cell is rarely departed from in health or disease, but in this affection, the margin of the corpuscles are indented and irregular, or there are various extensions of the stroma, giving to the corpuscles a balloon or hammer shape—alterations which cannot be mistaken for crenation.

3. The colourless corpuscles do not present any special characters, and are not actually, though they may be relatively, increased. The amæboid movements are active. In one or two instances they were reduced in size, and in a few cases in number.

4. Schultze's granules, so common in cachectic conditions, are absent.

5. In one case, nucleated red-blood corpuscles, such as occur normally in red marrow, were found.

In a large number of cases, hæmorrhages constitute an important symptom. Epistaxis is common, and this patient, as you heard, has had severe attacks. Retinal hæmorrhages frequently occur, and have been thought to be peculiar to the disease; but Litten† has shown that they develop in the anæmia

* *ποικίλος*, variously formed.

† *Berliner Klin. Wochenschrift*, 1877.

of cancer, and after severe loss of blood. In several of the cases which have occurred in this city, there were small cutaneous extravasations.

The *etiology* of the disease is, in many cases, obscure; but in others, well recognized predisposing causes may be traced. Of the recorded cases, the large proportion appear to have been in women, particularly in Switzerland, where the disease appears to prevail extensively, owing, doubtless, to local conditions. Thus, of ninety-three cases reported from the clinics of Berne and Zurich,* sixty-seven were females and twenty-six males. In England, the majority of cases have been males. Of eleven cases which I know of as occurring in this city, eight were males.

Among the more important causes which have been assigned, are: 1. Pregnancy and Parturition. Many of the cases on record have developed during pregnancy or shortly after delivery. It may be doubted whether such cases can be classed under the heading Idiopathic or Essential. 2. Defective food. A considerable proportion of the Berne and Zurich cases resulted from this cause, and were more correctly examples of inanition anæmia.

It is quite striking, in reading over the records of continental cases, to note how frequently this circumstance is mentioned, and the majority of the patients appear to have been derived from the lower classes; while here, and in England, many of the cases have been among the well-to-do. 3. Gastro-intestinal troubles, atonic dyspepsia or diarrhoea, have preceded the onset of the anæmia in a large group of cases. 4. Grief, mental shock or worry, have been mentioned by writers as probable causes. In one of the cases which occurred here (Dr. Gardner) the failure in health began after the death of two sons.

In the present case none of these causes can be assigned.

The *diagnosis* is arrived at only by the exclusion of all possible affections which might cause, or be accompanied by, great poverty of blood. You must carefully inquire into the history and mode of onset, interrogate the various systems

* Müller *Die pro. per. Anämie*, Zurich, 1877; Quincke, *Volkmann's Sammlung*, no. 100; and *Ziemssen's Archiv*. Bds. xx. and xxv.

and organs in a searching and methodical manner, when, if no definite disease can be detected the diagnosis of idiopathic or pernicious anæmia will probably be correct. The affections with which it would be most liable to be confounded, are: 1. Cancer of the stomach, some instances of which run a very latent course. In the case you have here, the gastric symptoms have not been marked, there is no tumour, nor tenderness, nor marked emaciation, and the disease has lasted a much longer time than cancer would. 2. The appearance of the patient and the retinal hæmorrhages suggest Bright's disease—and would still more if the ankles were swollen, as formerly—but examination of the urine is negative. No casts, no albumen. 3. From certain other blood diseases the diagnosis might be difficult, but scarcely in this instance. In leucæmia there might be the same pallor; the poverty of red blood corpuscles, the vascular murmurs, and the irregular, slight pyrexia, but we would have in addition, splenic enlargement, and a great increase in the colourless elements. Hodgkin's disease and splenic anæmia, while presenting a blood condition, closely resembling that of pernicious anæmia, would be distinguishable by the glandular enlargements. It is not improbable, however, that there is a relationship between these affections, which resemble each other so closely in certain clinical features. Litten* gives a remarkable instance of anæmia following parturition, in which three days before death leucæmia of a high grade developed.

In the *morbid anatomy* of this affection there are three points of interest, the extreme bloodlessness of the organs and the small quantity of blood in the heart and vessels, the advanced fatty degeneration of the heart and other organs, and the condition of the bone marrow.

[In certain cases, having a close resemblance to pernicious anæmia, Dr. Fenwick, of the London Hospital, has described an atrophy of the gland structures of the stomach; but what connection that has with the anæmia—whether as cause or effect—appears doubtful. In future, the stomach should be carefully examined in these cases.]

The bloodlessness of the organs is extreme, and the heart

* *Loc. cit.*

and arteries almost empty; in one instance I could collect only $\frac{3}{4}$ of blood from the chambers of the heart and the aorta. The fatty degeneration is secondary to the anæmia, and is a very constant change. Formerly, cases of this disease were described by some writers as, "idiopathic fatty degeneration." The alteration in the bone marrow has attracted considerable attention, and is believed by certain pathologists to have an important connection with the disease. The long bones have been found to contain a rich red marrow, which has replaced the normal fatty tissue of the medullary canals of bones of adults. This consists of granular marrow cells, small lymphoid corpuscles, myeloplques, red blood corpuscles, and large nucleated red corpuscles. The latter have been spoken of by many writers as if they were not a usual constituent of adult marrow; according to my observations they can always be found in the *red marrow* of the ribs and short bones, often in considerable number. [I am surprised that so good an observer as Prof. Rutherford, of Edinburgh, should state, in the little work on Practical Histology, which many of you use, that he has never been able to see these bodies in the marrow.]

This change in the medulla of the bones, in pernicious anæmia, was first studied by Pepper, Cohnheim and myself, and we were inclined to attribute to it a somewhat important rôle in the pathology of the disease. The position which I took in the matter may be gathered from the following remarks in a paper before the Canada Medical Association in 1877:

"Clinically, these cases present certain similarities to those of leukæmia and Hodgkin's disease, or pseudo-leukæmia. Now these latter diseases differ chiefly in this, viz., that in leukæmia the colourless blood corpuscles are in excess; in pseudo-leukæmia they are not. Both present three varieties: 1st, the splenic, in which the chief lesion is the great enlargement of the spleen; 2nd, the lymphatic, in which the lymph glands throughout the body are mainly affected; and 3rd, the ~~researches~~ of Neumann, Mosler, and others have made us acquainted with a variety known as the myelogenous or medullary, in which the marrow of the bones is the seat of disease. This tissue is now generally regarded as sharing, in the young animal at any rate, with the spleen and lymph glands, in the formation of blood cor

puscles. In the long bones of the adult it is in a state of atrophy, and its place, in great part, supplied by fat. In many cases of leukæmia and pseudo-leukæmia, it increases, becomes more vascular, its cellular elements multiply, nucleated red blood corpuscles, such as occur in the embryo, are formed, and the whole tissue passes into a condition of hyperplasia, strictly analogous to that affecting the spleen and lymphatic glands. This may be, as in a case recently reported by Mosler, the primary lesion in leukæmia, and the development of the marrow may produce definite symptoms, such as swelling and tenderness of certain parts of the bones; so that the myelogenous forms of these affections are now well recognized. Clinically, the myelogenous form of pseudo-leukæmia, though rarely uncomplicated, presents such a similarity to pernicious anæmia that Jaccoud and Immerman suggested the identity of the two affections, while Prof. Pepper, declared distinctly that pernicious anæmia was 'merely the simple medullary form of pseudo-leukæmia.'

"In the present state of our knowledge it may, I think, be reasonably affirmed that certain cases of idiopathic anæmia may be placed in the category of myelogenous affections. To many it may appear far-fetched to seek, in the altered condition of the bone marrow, an explanation of the extreme anæmia of this disease, but the reports of numerous cases leave no room for doubt that a serious alteration in its structure, and a return in adult life to its embryonic state, may profoundly influence the composition of the blood, producing anæmia and death. It must be borne in mind that the red marrow in the short bones of an adult probably equals in bulk the constituents of the spleen, and structurally is very similar to that organ and to the lymphatic glands. In the long bones it is largely replaced by fat, but traces of it still remain. Now, granting that the marrow is a tissue which shares in the blood-making functions, it is quite as reasonable to suppose that, if hyperplasia of the elements of the spleen can lead to serious disturbance in the composition of the blood, producing the splenic form of leukæmia or pseudo-leukæmia, according as the colourless corpuscles of the blood are increased or not, so a general increase of the constituents of the marrow may induce similar conditions. For it is to be remembered that, in a general hyperplasia of the

marrow, the actual amount of lymphoid tissue in the osseous system equals or perhaps exceeds, that of an enlarged spleen. Why a simple hyperplasia of this tissue should interfere with the elaboration of the blood, altering in the one case the mutual proportion of the corpuscles, and in the other simply reducing the total number, we do not know; but we are just as ignorant why an enlarged spleen and lymphatic glands should produce in the one case leukæmia, and in the other not."

When the paper was published, from which I have read you these extracts, a systematic investigation into the condition of the bone marrow, in various diseases, had not been made; but since then a number of observers have found this hyperplasia of the medulla in many chronic diseases, particularly in phthisis and cancer. In a considerable number of examinations, I have also met instances of red marrow in the long bones in chronic wasting disease, but not so frequently as Litten and Orth,* or Blechmann.† In only two instances have I found such intense and universal hyperplasia of this tissue as in the three instances of pernicious anæmia, which I have had an opportunity of examining. On the other hand, in eight cases of phthisis, and in two of cancer, (œsophageal and pyloric) I have found the marrow of the long bones fatty. I think that we have still a good deal to learn with reference to the bone marrow. I am not quite disposed to give up the view that some instances of pernicious anæmia may be of myelogenous origin. The similarity of the clinical features to leukæmia and pseudo-leukæmia, and the transition in Litten's case, from pernicious anæmia to leukæmia, suggest a close relationship.

Such a profound anæmia, as in the case before you, might result from one of two causes: 1st. A faulty formation of blood corpuscles—anhæmatisis, or loss of blood, either by hæmorrhage, chronic discharges or excessive destruction of the coloured cells—hæmophthisis.

Very many of the reported cases of this disease do not come strictly under the definition as given by Addison; but there have been various causes at work, productive of hæmo-phthisis. Dr. Howard holds that "all the various forms of anæmia,

* *Berliner Klin. Wochenschrift*, 1878.

† *Archiv. der. Heilkunde*, 1878.

i.e., forms, determined by the conditions, under which they occur, may occasionally take on progressive and pernicious characters." And this is the view taken by Quincke.

Dr. Howard further maintains that there is not a distinct variety of anæmia having an etiology and pathology peculiar to itself, and it is upon this point, particularly, that more light is wanted. The cases require sifting; and, for my own part, I would insist, with Immerman, "that no case should be accepted as belonging to this disease, unless, besides being an instance of extreme and fatal anæmia, it is also impossible to account, either rationally or empirically, for the progressive course of the anæmic symptoms."*

The *prognosis* is most unfavourable; all of our Montreal cases have died. Of the sixty-four Zurich cases, given in Müller's monograph, only seven recovered. Of Quincke's thirty-one cases, eleven are stated to have recovered; but you must remember, with reference to many of these Switzerland cases, that they come more properly under the head of inanition anæmia. The duration of the disease is from three months to a year. This case is remarkable as lasting for over three years. One of Biermer's patients lived for five years after the first onset of the symptoms. The most rapid course in his cases was seven weeks.

The *treatment* is not very satisfactory. Special attention must be given to the weak digestion which almost invariably accompanies the disease. Iron, in some form, should be employed; this patient has been taking Bland's pills for some weeks, but without any apparent benefit. Arsenic should be given, as several successful cases have been reported under its use; it may be given in combination with the iron. Our patient has not been taking it long enough for us to say whether it is doing any good. Transfusion of blood has been employed in many cases, but without very encouraging results. Quincke, however, has had several successful cases. He transfuses into the radial artery. The transfusion of milk, as first employed by my old preceptors, the late Drs. Hodder and Bovell, of Toronto, is stated to have cured, even after blood transfusion had failed.

* Quoted by Hartshorne in his article on "Prog. Pernicious Anæmia," in the American edition of Reynolds's System, Vol. III.

CLINICAL LECTURE

ON A

CASE OF FIBROID PHTHISIS.

By WM. OSLER, M.D., M.R.C.P., LOND.

Professor of the Institutes of Medicine in McGill University, and Physician
to the Montreal General Hospital.

DELIVERED AT THE MONTREAL GENERAL HOSPITAL IN THE SUMMER SESSION COURSE,
MAY 10, 1881.

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REPORTED STENOGRAPHICALLY BY S. A. ABBOTT, ESQ., OF THE HANSARD STAFF.

GENTLEMEN : There is no disease that you will have greater difficulty in thoroughly understanding than phthisis. I have no doubt that to many of you the difficulties which this subject presents have already become apparent. It is, in fact, at present, the bugbear of medical students, particularly in their last year. This is owing in great part to the inherent complexity of the subject, and in part, I am sorry to say, to the exceedingly diverse theories and views which at present prevail upon the pathology of the disease.

The simplest classification of phthisis is into pneumonic, tuberculous and fibroid varieties. It is of the last that I wish to speak to you to-day, and to show you this interesting example of the disease which many of you have already studied in the ward. This form of phthisis is characterized by certain peculiar features. In the first place, it runs an unusually long course. Patients may live for twenty-five or thirty years ; in many instances, indeed, it does not diminish to any great extent their term of existence. I will refer, in a few minutes, to a case of a gentleman who has been under Dr. Howard's observation for the last twenty or twenty-five years, and who only died last week of the affection.

Then, in the next place, it lacks certain of those characteristic features which we recognise in ordinary phthisis. The patients have not night sweats ; they rarely have diarrhoea, and the loss of flesh is not very marked. They may have attacks of

hæmoptysis, occurring usually at long intervals. On examination they present certain peculiarities, so much so, that superficial inspection alone may be sufficient to give you a good idea of the nature of the disease from which the patient is suffering. There is generally some contraction of one side the chest, accompanied by deficient expansion and some degree of immobility. There is not much fever throughout the disease except towards the close. Most of the patients are able to engage in the ordinary occupations of life and are only troubled with a cough and more or less expectoration. As a rule they enjoy a tolerably quiet existence for a long period of time. They are subject to recurring attacks of bronchitis, particularly in the winter season. The history of this patient is as follows:

J. W., aged 44, a native of Sheffield, a saw-maker by trade, admitted April 18th with cough and shortness of breath. Family history is good; none of his relations have died of consumption. Has worked at his trade from his youth; the special work which he does is beating the saw blades and is not accompanied by much dust. Has been a pretty steady drinker, though not a drunkard. Was strong and healthy up to about five years ago, when, in the winter of 1875, he spat a small amount of blood and had a cough, but did not leave off work. Had no pain in the side; does not think that he was feverish. The next spring he returned to Canada and remained well until the autumn, when he entered hospital for bronchitis. He has had a cough ever since, and has been laid up part of each winter, getting better in the summer. He has spat blood on several occasions, but never much at a time. Has not had night sweats or diarrhoea. Has lost flesh, particularly in the last four months. Coughing is chiefly in spells, which are violent and very often accompanied by vomiting. Has never brought up very large quantities at a time; never noticed the phlegm to be stinking. Has not had palpitation of the heart; feet have never swollen. The fingers are clubbed and the nails incurvated.

This man has suffered for the past five or six years from these

symptoms, the cough coming chiefly in the winter, during which time he has had to lay up for a longer or shorter period.

(The patient disrobes to the hips and is examined.)

Notice in the first place that the left shoulder is a little lower than the right. There is decided flattening of the left half of the chest, and when he draws a full breath there is deficient expansion. The heart is drawn a little to the left and is beating a little outside the nipple line, but it is not displaced nearly to the extent we sometimes find it. Sometimes you may find it beating high up in the mammary region, owing to the drawing up of the heart by the contraction of the lung. On measurement of the chest the left side is smaller than the right: the left measures $15\frac{1}{2}$ inches and the right side 16 inches, not so great a difference as one might have expected. On percussion you will notice that there is uniform dullness, a hard, flat note, over the whole posterior region of the chest, and a similar note in front. The note is nowhere tubular, as is sometimes found. There is a little resonance high up in the axillary region. The tactile fremitus is not markedly increased, but the vocal resonance is greatly exaggerated, approaching to bronchophonic over the greater portion of the dull regions.

On auscultation you hear very peculiar and characteristic sounds. The breathing in front is hollow, and of the character known as cavernous. It is accompanied by râles, some of which are whistling and piping, and others, just below the clavicle are more gurgling in character and suggest bubbles passing through a liquid. These cavernous sounds are heard all over the front and in the lateral regions. The breathing at the upper part of the lung behind and in the left inter-scapular region is weak, as those of you who have examined this man will remember. At the outer angle of the scapula the breathing is intensely hollow, approaching to amphoric, and is also accompanied by râles. The voice sounds are heard with much greater intensity—pectoriloquy.

These are the chief features on a physical examination of this patient. You find flattening of the left side of the chest, deficient expansion, dullness, increased vocal resonance, and

numerous cavernous signs over the greater portion of the dull region. At the apex behind and in the left inter-scapular region, the breath sounds are somewhat diminished, being weaker than in the other regions. Over the right lung the breath sounds are clear except at the extreme apex of the lung. At this part you hear coarse breathing, a prolonged expiratory murmur and râles. These are heard in the right infra-clavicular region and at the apex behind. In the rest of the lung the breathing is loud, distinct and unaccompanied by râles.

Now the affections which could produce such a condition as this are very limited. There are only three or four which cause contraction and immobility of one side of the chest, with a dull percussion note. These are fibroid phthisis, or cirrhosis of the lung; chronic pleurisy with retraction, and malignant disease of the lung, and you have to distinguish between them. The immobility of the side of the chest and the dull note might be produced by a general collapse of the lung, or by a chronic pneumonia, but you would scarcely have the flattening and retraction.

Now, between fibroid phthisis and a cancer of the lung there can rarely be any difficulty in the diagnosis. In the case of this patient the phthisis has lasted for five years, cancer of the lung seldom lasts over a year. Cancer of the lung almost invariably invades it from the mediastinum, and you have other symptoms of intra-thoracic pressure which we have not in this patient. Moreover the cachectic appearance of a patient with cancer is marked. There can be no doubt in such a case as this.

The diagnosis between chronic pleurisy with retraction and this condition of fibroid phthisis, presents greater difficulty. In both you have dullness, deficient expansion and retraction of one side of the chest. The shoulder is usually depressed much more on the affected side in chronic pleurisy with retraction than in fibroid phthisis. The chief differences to be met with on auscultation of the chest are these: in chronic pleurisy with retraction you do not find the cavernous signs, which are so commonly heard in fibroid phthisis. The breathing is weak and feeble. Some of you may remember the patient with chronic pleurisy, with retraction, that was in No. 11 Ward two summers

ago. That man had lowering of the shoulder, retraction of the side, and dullness over the greater part of his lung. The diagnosis between collapsed lung and chronic pneumonia I need not go into.

Now with reference to the morbid anatomy of this disease, the affection is known as fibroid phthisis or cirrhosis of the lung, both terms indicating an increase in the fibrous elements of the organ. The latter term was given by Sir D. Corrigan, and I pass around the Plate illustrating his paper. It is, in fact, a fibroid substitution: the normal, histological elements of the lung are replaced by a fibrous tissue which in time undergoes contraction, as all new growths of fibrous tissue do. On examination of one of these patients after death you will have such a condition as you see in the lung I now exhibit to you. This was from a case of cirrhosis of the lung, which died under Dr. Ross's care in the hospital, in January, 1877. In the first place, the lung is greatly reduced in size. It was firmly connected to the chest wall, the pleura is much thickened, in places nearly an inch in diameter. On feeling the lung it does not crepitate, but is firm, dense and leathery. When cut it has a marbled look, being interspersed with areas of pigmentation. At the upper part of it you see an extensive cavity with thick walls, communicating directly with several bronchi. Certain of the bronchial tubes are much dilated, not so marked in this specimen as in others which I have seen.

The characteristics I have given you as pertaining to this special lung may be taken as belonging to the great majority of cases of fibroid diseased lung. In the case from which the specimen was taken, there was a very small cavity in the apex of the other lung, the rest of the organ was healthy.

Now in connection with the morbid changes in this disease you usually find that the heart is increased in size. It is hypertrophied, particularly the right ventricle. That chamber has an increased amount of work to do, because of the reduction in the number of capillaries in the lungs. The one lung is cut off in great part from the circulation, and in consequence the right heart has an increased amount of work. The unaffected lung is usually of large size, as in this specimen from the case to

which I referred a short time ago. The patient requested that after his death his lung should be sent to Dr. Howard for examination, as the doctor had watched the case for many years. You see what a large lung it is. It is much hypertrophied; the other lung was reduced to such an insignificant condition that the medical man who performed the *post mortem* was not able to find it. He speaks of a mass of jelly-like substance, but no lung. No doubt it was shrivelled to a piece not the size of my hand, and flattened against the vertebral column. In the heart from this case you will see the thickening of the right ventricle, the walls of which are much hypertrophied.

In the late stages of the disease, particularly in cases with extensive cavities in the lung, it is not uncommon to meet with amyloid degeneration of the various organs. In a case which was under my care in the summer of 1879, in Ward 23, there was extensive amyloid degeneration of the liver, spleen and kidneys. The kidneys and the liver occasionally present evidences of the same disease, namely, sclerosis.

Now with regard to the causation or etiology of this disease, there can be no doubt that it is complex. In fact, several different varieties may be recognized. We may speak, indeed, of phthisis as a genus which has several species, and each of these species has several varieties. Phthisis being the genus, it has, as species, the tuberculous, the pneumonic and the fibroid. Now the fibroid species has several well marked varieties, just as the species of animals and plants have different varieties. The first you can call the *bronchitic*; that is to say, chronic bronchitis precedes the disease and appears to stand in causal relationship with it. The second is *pleuritic*. The disease is caused by and depends upon a fibroid induration of the pleural membranes, which induration extends to and involves the entire lung. According to some writers, a very considerable proportion of the cases of fibroid phthisis belongs to this special variety. Thirdly, there is the *pneumonic*; about that there is a great deal of doubt. Certain writers state that one mode of termination of a simple pneumonia is in fibroid induration of the lung. The exudation does not resolve, the dullness persists and ultimately fibroid

changes go on in the air cells until the entire organ becomes indurated. I do not know of any instance on record in which the pneumonia has been definitely followed until the case resolved itself into one of fibroid phthisis. The fourth variety is *syphilitic*. There can be no doubt that syphilis may induce a fibroid condition of the lungs. Many cases have now been recorded of fibroid induration, occurring chiefly in patches, which are directly due to syphilis. The last and most important variety is that due to the *inhalation of dust*. This is a variety known as miners' phthisis, stone-cutters' phthisis, axe grinders' and file sharpeners' phthisis. In this variety the inhalation of particles of dust and grit excites a chronic bronchitis; fibroid induration occurs about the bronchi and gradually extends throughout the lung until you have extensive fibroid areas. In the past five years I have had three instances of this variety under my care. I show you here a lung presenting what is known as the carbonaceous cirrhosis, or miners' phthisis. You see that the greater portion of it is converted into a mass of firm, dark tissue, looking more like a bit of hard coal than a lung. The greater portion is indurated by this growth of fibroid tissue and the deposition of these dark carbonaceous particles. That the dark coloring matter in the lungs is due to the inhalation of coal particles, is proved by the fact that on examination you can see portions of the vegetable tissue of the coal. In this drawing which I made from a case of miners' phthisis which occurred under my care in 1876, you will see portions of the scalariform tissue and of dotted ducts, both taken from the case to which I refer. The workers in the foundries and axe manufactories of Sheffield are very prone to a form of fibroid phthisis, produced by the inhalation of particles arising from the grinding of tools. In the same way the workers in the iron mines are subject to a form of fibroid phthisis which is called *siderosis*. The coal miners' phthisis is known as *anthracosis*. These are the chief varieties of fibroid phthisis, divided according to their exciting causes. In most of the cases both lungs are affected. In the common form such as you have before you, due, apparently, to chronic bronchitis, only one lung is involved; why, it is difficult

to say. Usually, at least in all the case I have examined, there have been traces of caseous matter, either in the affected lung or in the apex of the sound lung. This does not necessarily indicate that these were tuberculous in their origin, though it is of course possible for the tuberculous form of the disease to undergo fibroid degeneration.

The course of the disease, I have already told you, is exceedingly chronic. The patient of Dr. Howard's to which I referred was under his observation for over twenty-five years. Indeed, chronicity is one of the remarkable features in connection with the disease. The patients suffer from attacks of bronchitis, which come on during cold weather. The cough is apt to be spasmodic, the expectoration is usually profuse, very often half a cupful or a cupful is brought up at a time. The phlegm is frequently stinking, having remained lodged for sometime in a cavity or in a dilated bronchial tube. There is not much fever except when the patient takes a fresh cold. Several symptoms come on towards the close when the hypertrophy of the right ventricle of the right side of the heart begins to fail. When there is dilatation of the right ventricle and incompetency of the tricuspid valves, they then begin to have dropsy of the legs, sometimes dropsy of the belly. These symptoms usually precede a fatal issue of the case. That is a very common train of symptoms, and it occurred in the case of a woman who was under my care in Ward 23, in 1879. Other cases die of *asthenia* or gradual failure of strength. Expectoration becomes more profuse, and they die of gradual wasting. The man who died under my care this time last year of miners' phthisis, and whose lung I now exhibit to you, died of *asthenia*. He had been under my care for two years, and gradually coughed himself away. Then, again, other cases die of waxy degeneration of the organs. The chronic loss of pus from the cavities in this disease, tends to produce the peculiar degeneration known as waxy or amyloid. The woman I spoke of as dying in Ward 23, had extensive amyloid degeneration. Lastly, some cases die of hæmorrhage from the lungs, which is not an uncommon symptom. The bleeding is caused either by rupture of a small aneurism on the walls of one of the cavities, or ulceration of the branch of an artery.

The prognosis depends entirely on the condition of your patient. In this man's case the outlook is bad. He has lost a good deal of flesh in the past year, disease is evidently commencing in the other lung, in which there is a cavity at the apex, and he very probably has tuberculous disease. Where the one lung is healthy and uninvolved the patient may live for a considerable period of time and enjoy comparatively good health.

Nothing special need be said with reference to treatment. It is entirely a treatment of symptoms. This man came in with severe cough; he was put to bed and given a sedative cough mixture, and soon felt improved. The shortness of breath diminished, and he is now feeling pretty comfortable and is ready to go out. During the summer months these patients always improve; during the winter months their bronchitis is aggravated and they are always more troubled with a cough.

One point with reference to the treatment, and it also bears upon the cause of the disease, and that is, the use of alcohol in phthisis. It is believed by many, that the use of alcohol in large quantities in certain forms of phthisis tends to produce a fibroid degeneration of the affected lung, and of course tends to a cure, because this fibroid substitution in a lung is in a measure a healing process. Now it is a peculiar fact in connection with many of these cases of fibroid phthisis, that they occur in persons who have been habitual drinkers. Such has been the experience of Dr. Andrew Clark, who was one of the first to call attention to this affection. It has also been the experience of the physicians at Guy's Hospital, and of many other English physicians. The man we have just examined seems to have been a pretty hard drinker. I merely mention this as an interesting fact in connection with this disease.

This patient will remain in until to-morrow afternoon, and I would recommend those of you who have not already done so, to examine him thoroughly and try to get the main features of the case impressed upon your minds, as he affords an exceptionally good illustration of the disease.

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ON SOME OF THE EFFECTS OF THE
CHRONIC IMPACTION OF GALL-STONES
IN THE BILE-PASSAGES,

AND ON THE "FIÈVRE INTERMITTENTE HÉPATIQUE"
OF CHARCOT.

*Delivered in the Demonstration Course on Morbid Anatomy,
January 15, 1881*

BY

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ON SOME OF THE EFFECTS OF
THE CHRONIC IMPACTION OF GALL-STONES
IN THE BILE-PASSAGES,

AND ON THE "FIÈVRE INTERMITTENTE HÉPATIQUE"
OF CHARCOT.

GENTLEMEN,—I propose to call your attention this morning to some of the effects of the impaction of gall-stones in the biliary passages. The specimen before you, obtained from an old woman who died this week of septicaemia (Case 5) after a fracture, illustrates the distension of the gall-bladder and ducts which follows the lodgment of calculi, and it has served to remind me of other cases which have come under my observation. I shall therefore occupy the hour with this subject, and shall, moreover, depart somewhat from my usual custom in this course, and speak of certain clinical features in these cases which have not received much notice at the hands of English writers.

I will first speak of the effects of impaction of a gall-stone in the cystic duct. This tube is narrower than the common duct, and its mucous membrane is not uniformly smooth, but presents numerous transverse and oblique folds, so that it is almost impossible to pass a probe up or down its course. These valvular folds (valvula Heisteri) often form definite pockets, and the entire arrangement is certainly not the most favourable for the easy passage of a calculus.

The following effects may result from the plugging of this duct:—1. Dilatation of the gall-bladder. 2. Inflammation of its coats—catarrhal, diphtheritic, suppurative, or phlegmonous. 3. Obliteration. 4. The formation of fistulae with contiguous organs.

The dilatation may attain a very high grade, and the organ contain several pints of fluid. The following instance is remarkable, as the distended gall-bladder reached to the pelvis, and was diagnosed as an ovarian tumour:—

Case 1.—On March 23, 1877, I performed an autopsy on a patient of the late Dr. Bell, a woman aged fifty-eight. In August, 1876, she consulted Dr. Bell for pains in the back and loins. He made a vaginal examination, and determined the presence of a tumour, apparently connected with the right side of the uterus. She became jaundiced on December 25, and gradually began to get emaciated. The tumour was evident anteriorly, but it could not be traced to the costal border, a zone of resonance intervening. On March 3, when it was being examined in the lower part, it was suddenly felt to give way, as if something had ruptured. At the post-mortem the gall-bladder was found enormously distended, reaching to within two inches of the pubes. On the surface of the right broad ligament was a round space covered with fibrin and deeply hæmorrhagic. On the apex of the gall-bladder was an irregular surface corresponding in size to that on the broad ligament; it looked as if the tumour had been attached at this point, and had been dislodged at the examination on March 3. There was no uterine or ovarian disease. The gall-bladder contained a quantity of a turbid and bloody fluid, and a large, recent-looking clot of blood. On the posterior wall there was a large ulceration, the base of which was hæmorrhagic. Nine or ten gall-stones were found, one being lodged in the duct. An irregular mass of cancer occupied the neck of the gall-bladder, and several nodular masses were found scattered throughout the substance of the liver.

More commonly, the dilatation which results from the impaction of a gall-stone in the cystic duct is of very moderate dimensions, and may produce no symptoms during life, as in the following examples:—

Case 2.—M. G., aged thirty-five. Death from abscess in broad ligament. Liver fatty. Gall-bladder of average size, contained about twenty concretions, the size of small cherries, and an ounce of a turbid, viscid fluid. A gall-stone the size of a large pea was lodged in the upper part of the cystic duct. So far as could be ascertained, this woman had not suffered from any symptoms referable to biliary derangement.

Case 3.—J. B., aged thirty-eight, died of heart-disease twenty-two hours after admission to the hospital. Liver

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congested; nutmeg. Gall-bladder moderately distended; contained a clear, slightly viscid fluid, with thirty concretions of various sizes, one of which, as large as a cherry, plugged the mouth of the cystic duct.

Case 4.—J. S., woman, aged sixty-five, died of emphysema. No history of any biliary disorder. Liver small and soft. Gall-bladder projected two inches below the edge of the organ, and contained about two ounces and a half of a clear, slightly viscid fluid, with two gall-stones; one, the size of a walnut, lay free in the sac, the other, as big as a marble, was firmly wedged in the first part of the cystic duct. The mucous membrane of the bladder looked normal.

Case 5.—Mary G., aged seventy-five, died from septicæmia after a fracture. Was not jaundiced. No history of biliary colic. Liver not enlarged; soft and fatty. Common bile-duct dilated to the size of the little finger, and the enlargement extended to the branches in the liver. They contained bile. Mucous membrane looked normal. A small calculus was situated in the terminal portion of the duct, about 8 mm. from the papilla. The gall-bladder was moderately dilated, and contained an opalescent, viscid fluid and fifteen calculi, chiefly of small size. Two, the size of peas, were lodged in the fossæ of the cystic duct and completely obstructed its lumen.

A fortunate termination in a case of distended gall-bladder, which produced symptoms during life, is illustrated by the following, in which obliteration of the sac took place:—

Case 6.—E. B., aged forty, a large, powerfully-built man; patient of Dr. Finnie's. Death from pneumonia. Eight years before his final illness he had suffered with an abdominal tumour, situated in the right hypochondriac region, which caused uneasiness and pain, but no serious trouble. He was seen by a great many medical men, and very diverse opinions appear to have been given as to the nature of the tumour. It lasted for many months, and then gradually disappeared. He left instructions that his body should be examined, in order to find out the cause of the tumour which had given him so much anxiety. Liver of large size, but healthy. Common duct pervious. Cystic duct dilated at its distal end, occluded in its upper part. Gall-bladder was small and shrunken, and its coats tightly embraced two gall-stones, the size of large cherries. A membranous septum separated the stones, and the walls of the bladder

were so closely adherent that it was difficult to strip them off from the rough surface of the calculi.

I have seen another instance in which this condition of the gall-bladder occurred, but I have no notes of the case.

Inflammation of the gall-bladder (cholecystitis) not infrequently follows obstruction of the duct. More or less catarrh is probably a constant sequence, but the severer affections are rare. Diphtheritic inflammation is met with, leading to ulceration and even perforation. Gangrene is mentioned as occasionally occurring in and about the ulcers. A remarkable instance of primary inflammation passing on to gangrene happened recently in the practice of Dr. Howard, and I had an opportunity of inspecting the body:—

Case 7.—J. C., aged forty-eight, an old soldier, temperate and healthy. Taken ill on Tuesday, October 12. Chief symptoms—vomiting, pain in abdomen (particularly on right side). On account of the obesity a satisfactory examination of the abdomen could not be made. Many of the symptoms were those of obstruction of the bowels. No previous history of gall-stones. At the autopsy, localised purulent peritonitis about anterior border of liver, and between it and the transverse colon. Gall-bladder moderately distended; walls tense, and of a dark livid aspect; when slit open, a dirty, brownish-red, ill-smelling fluid escaped, and six or eight light coloured gall-stones. A calculus was found in the orifice of the cystic duct. The mucous membrane was not ulcerated, but was dark, and the coats looked sphacelated, particularly towards the fundus. The common and hepatic ducts were free, and there were no other special morbid features.

Between a dilated and inflamed gall-bladder and contiguous parts adhesions may form and fistulous communications be established by ulceration. Thus it may happen that the dilated sac adheres to the abdominal wall, ulceration at the fundus occurs, and by suppuration the skin is perforated and an external fistula established. Murchison has noted over eighty-seven cases of this kind. It is not uncommon for a fistula to form with the duodenum, more rarely with the colon or stomach. The following cases illustrate these latter varieties:—

Case 8.—S. J., a man aged forty-six; death from a low pneumonia after severe fracture. No history of biliary colic. Liver not enlarged; common and hepatic ducts normal. Gall-bladder was of small size; but the pylorus and first part of the duodenum were adherent to it. When opened, a small quantity of purulent fluid escaped, and two

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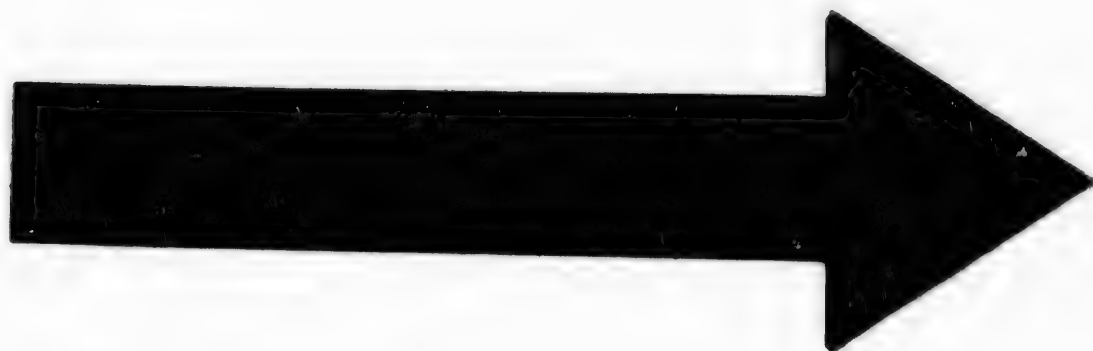
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large calculi, the size of filberts, occupied the cavity. Two wide fistulae led into the duodenum and stomach; that to the latter did not perforate the mucous membrane directly, but formed a small abscess beneath it, the orifice being about 2 cm. within the ring. The one to the duodenum was shorter, and would have permitted the passage of a pea.

Case 9.—R. S., aged forty-eight, a stout, well-nourished person; patient of Dr. Rodger, of Point St. Charles. Fifteen years before her fatal illness she had an attack of what was called inflammation of the liver; there was no jaundice, but ever since she had been troubled with dyspepsia and more or less feeling of discomfort in the region of the stomach. Her last illness extended over about three months, and the chief symptoms were jaundice, epistaxis, and occasional melena. Death took place by hæmorrhage from the stomach and bowels. Stomach, duodenum, and transverse colon were closely adherent to the under-surface of the liver near the gall-bladder. Immediately outside the pyloric ring, in the upper and back part of the duodenum, was a large orifice 3.5×1.5 cm. partially blocked with clots, and communicating with the gall-bladder and an irregular cavity at the hilus of the organ. The source of the hæmorrhage was found to be an ulceration of the right branch of the hepatic artery. The gall-bladder was much ulcerated and communicated freely with the duodenum and with the irregular cavity at the hilus. At its fundus there was a fistulous opening into the colon, 7 mm. in diameter. Whether this represented the perforation of a duodenal ulcer into the gall-bladder, or the orifice caused by the passage of a large gall-stone into the duodenum, it is impossible to say. The extensive ulceration of the gall-bladder and the fistulous communication with the colon rather favour the latter view.

The very large calculi, which are sometimes passed per rectum, and which may induce symptoms of obstruction, most probably ulcerate into the bowel, and do not pass the common duct.

We will turn now, gentlemen, to the consideration of some of the effects of impaction of gall-stones in the common duct. The usual site for the lodgment of the calculus is in the terminal portion of the duct, the pars intestinalis, as here the calibre is considerably narrower than elsewhere. You see in this specimen taken from Case 5, above mentioned, how small a stone may find difficulty in getting through. It is impossible to say exactly how large a concretion may pass.



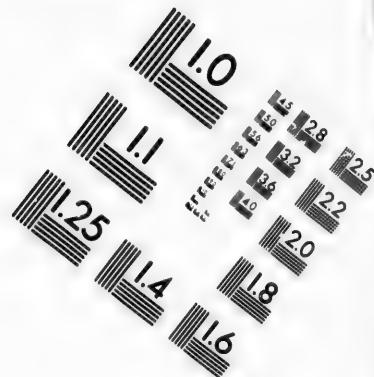
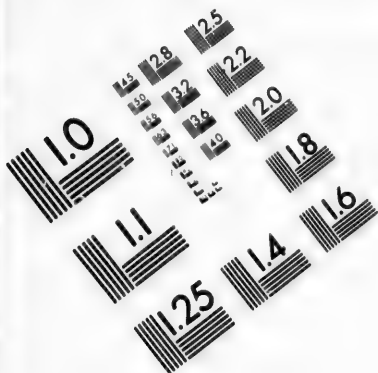
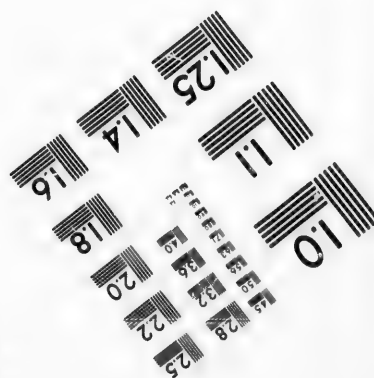
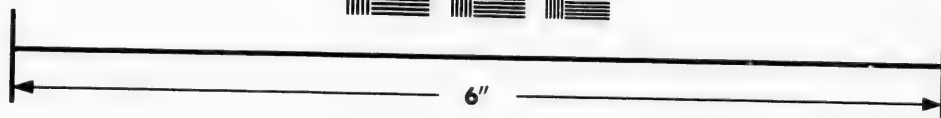
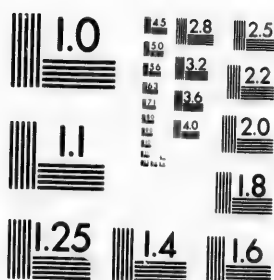


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Von Schweppel* places the limit at about 1 cm. in diameter. It is important for you to bear in mind that a gall-stone may remain permanently lodged in the pars intestinalis, and yet not be impacted. In such instances it may still permit the passage of bile past it, or it may act as a ball-valve and only permit of the flow when the distension behind has reached a certain point. Dilatation of the bile passages is the constant effect of permanent obstruction. At first they contain bile, but subsequently, if the channel is not re-established, this may be absorbed, and a clear mucoid fluid take its place. In obstruction from the pressure of tumours, etc., the enlargement of the ducts and gall-bladder may be excessive, and even the finer branches in the substance of the organ become dilated into tortuous canals which can also be seen beneath the capsule.

Inflammation of the bile-ducts (cholangitis) not infrequently succeeds dilatation, and may go on to suppuration, as in the following instance:—

Case 10.—Calculus at Orifice of Common Duct—Dilatation and Suppuration of Bile Passages and Gall-Bladder.

Unfortunately I have no history of the case, but it occurred in an old man who had been ill for nearly a year with symptoms pointing to hepatic disorder.

When the duodenum was laid open a dark spot was noticed at the papilla biliaria, which proved to be a gall-stone as large as a marble, lodged just within the orifice. It was freely movable, and could readily be pushed away. Behind it the common duct was much dilated, measuring 4.5 cm. in circumference at the orifice of the cystic duct, and 5.5 cm. at the hilus. The contents were purulent and tinged with bile. The ducts throughout the liver were dilated, and several as large as goose-quills coursed beneath the capsule of the right lobe. They all contained pus, and the walls were thickened. The gall-bladder was greatly dilated, and had formed close adhesions with the anterior abdominal wall, the duodenum, and the colon. When slit open, nearly a pint of pus escaped, and two small calculi. The walls were extensively ulcerated, and the contiguous part of the liver was rough and suppurating.

I wish more particularly to direct your attention to some remarkable symptoms, which occur in patients the subject of chronic obstruction of the common duct, and which are described at length by Charcot in his "*Leçons sur les Maladies du Foie et des Reins*." Under the name "*fièvre*

* "*Ziemssen's Encyclopaedia*," art. "*Bile Passages*."

intermittente hépatique" he has given an account of attacks resembling closely paroxysms of ague, characterised by severe rigors, fever, and sweating. He states that these must not be confounded with the rigors and fever which sometimes accompany an attack of hepatic colic.

The following cases, which have been lately under my care, illustrate this symptom in a most admirable manner:—

Case 11.—Obstruction of the Common Bile-Duct by a Large Calculus for over Nine Months—Repeated Ague-like Paroxysms—Jaundice—Passage of Gall-Stone—Recovery.

N. K., aged thirty, a dark-complexioned, slightly-built woman, was admitted to hospital, under Dr. Wright, on November 17, 1879. She had been subject to attacks of indigestion, but otherwise appears to have been healthy. About four years ago she had several attacks of severe cramp-like pains in the abdomen, but she had no more for over two years, until the middle of September, 1879, when they came on again after a wetting. She had vomiting at this time, and such severe pains that morphia had to be administered hypodermically. Two days after she became deeply jaundiced. The attacks of pain recurred, and the vomiting was very troublesome, but in about two weeks she was able to go to her home, where she remained until her admission to hospital. The jaundice had persisted, and the "painful spells," as she called them, came on at intervals. When admitted she was suffering with jaundice, dyspepsia, and general debility. She remained in hospital during the winter, and I found her in Ward 23 when I took charge in April; and many of you had an opportunity of seeing her during the early part of the summer session. During a residence of five months and a half in hospital the chief symptoms were (1) jaundice, varying greatly in intensity, sometimes almost disappearing, but only to recur again in a few days; (2) ague-like paroxysms, chills, fever, and sweating, accompanied with severe abdominal pain, coming on at intervals of from three to ten days; (3) great impairment of appetite, dyspepsia, and frequent vomiting, especially during and about the time of the paroxysms; (4) great tenderness, particularly at times, in the epigastrium, most marked near the right costal border.

The way in which these paroxysms came on was usually as follows:—After an interval of a week or ten days, during which time the jaundice would diminish, the bile almost or entirely disappear from the urine, the feces become slightly bile-tinged, the appetite improve, and the patient sit up, she

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would have a chill, sometimes only a transitory feeling of cold, at others a severe rigor in which she would shake as in an ague-fit. This stage lasted a variable time, from fifteen minutes to four hours, depending on the severity of the attack, and was followed by heat of skin and general feeling of warmth, after which sweating came on. The entire paroxysm, when well marked, lasted several hours. The temperature, which was normal, or even subnormal, rose during the attacks, reaching from 102° to 104° , and subsided quickly, sometimes sinking to 97° . The fever rarely lasted for twenty-four hours.

On the evening of March 28 a severe paroxysm came on, and the temperature rose to 103° . She had a very bad night, and the thermometer indicated 104° at nine o'clock in the morning of the 29th. At 7 p.m. it was 97° , and she was feeling comparatively comfortable.

Among the concomitant symptoms of these attacks, vomiting and severe gastric pain were the most common. The pain usually gave indication of the onset, and resembled that of hepatic colic, being epigastric, radiating, and often complained of beneath the right shoulder-blade. It was scarcely the agonising pain of genuine biliary colic, but was often severe enough to require morphia. Before and after the attack the epigastrium was very tender, so much so that she even complained of the weight of the bed-clothes.

Vomiting was a marked feature throughout the course of the disease, usually accompanying the paroxysms, and also frequent enough in the intervals, particularly after taking food. Bowels were moved each day, sometimes two or three motions. Colour depended on the intensity of the jaundice. For a long time the motions were filtered in the hopes of finding gall-stones. Invariably, after an attack the jaundice deepened, and we could generally tell the next day by her appearance alone whether she had had a paroxysm. The urine became bile-tinged, often deeply, and the stools clay-coloured. This would last for a day or so, and then the urine would get clearer, the bile-pigments disappear, and the stools get a little colour. In the intervals the pain subsided, the nausea and vomiting were less troublesome, but the appetite was very poor; for days she could not take anything but a little biscuit and milk. She usually remained in bed, but during a longer interval than usual would sometimes get up. Itching of the skin was occasionally a prominent symptom.

On April 8 I examined her carefully, and the following condition was noted:—"Is jaundiced and moderately wasted. Nothing special to be noted on inspection of abdomen. On

palpation, decided tenderness in epigastric region, most marked towards the right costal border; no special fullness or sense of increased resistance in this part. Hepatic dullness in nipple line extends from upper border of sixth rib to within half an inch of the costal margin. To the left the dullness can be traced well into the hypochondriac region. Splenic dullness of two inches and a half. Nothing abnormal on examination of heart and lungs. Urine is bile-tinged, gives a play of colours with nitric acid; specific gravity 1020. Numerous darkly granular bile-stained casts, some containing epithelial cells. Faeces clay-coloured, soft, a little offensive. Tongue is clean. Pulse 85; temperature normal.

About the end of April she left the hospital, and went to her home in St. John's, where she was attended by Dr. Robert Howard, who diagnosed gall-stones, and gave bicarbonate of potash. She had several paroxysms, and continued jaundiced. On June 3rd she passed a large round gall-stone weighing sixty grains and measuring over 1 cm. in diameter. She improved very rapidly after this; the jaundice disappeared, and she has recovered her usual health and strength.

Case 12.—Obstruction of the Common Duct lasting over Eighteen Months—Jaundice of Varying Intensity—Numerous Ague-like Paroxysms.

On November 9, 1880, I was asked to see Mrs. S., aged fifty-five, a well-nourished woman, wife of a florist, and accustomed to work in the greenhouse. I found her deeply jaundiced, and suffering with intolerable itching. She had always been a healthy woman, and had borne five children. Present illness began in July, 1879, and I am indebted to Dr. Simpson for the following particulars of the onset and development of the disease:—"On July 8th and 12th, 1879, Mrs. S. consulted me at my house for a mild attack of jaundice, which she ascribed to having lately seen a disgusting object, emitting a most offensive odour, which had caused her to feel sick. When a young girl she had a similar attack from fright. On August 4 I was sent for to visit her. In the interval the jaundice had become less intense. I found her deeply jaundiced, and complaining of nausea, dull pains in the region of the liver, and general discomfort. She remained in this state until the morning of the 6th, when she was seized with an alarming chill and intense pain below the ribs on the right side, extending to the epigastrium and to the right shoulder. It was increased by pressure and motion. The breathing was oppressed, and the anxiety of the patient most distressing. The chill in a couple of

hours gave place to a high fever, which was followed by a copious sweating, that stained the sheets of a deep yellow colour. The liver was found to be slightly enlarged. The intense pain gradually abated, but the tenderness persisted for several days. All of the essential phenomena of jaundice were present. She remained under my care until January, and during this period she suffered every two or three weeks from a paroxysm, varying somewhat in intensity and duration, such as I have described, except that the acute pain became less and less on each occasion, until at last there was scarcely any; but the chill, fever, and perspiration were invariably present, constituting, with an increase of the jaundice, the entire paroxysm. Itching of the skin was a most distressing symptom throughout, often preventing sleep and rendering life almost unendurable. The stools were repeatedly strained for days together, but no gall-stones were found. The slight enlargement of the liver disappeared."

I ascertained from her that during the early part of last year the attacks continued, but during the summer (under homœopathic treatment) the jaundice almost disappeared, and she had not a paroxysm for several weeks. Latterly they have recurred every week or ten days. On the occasion of my first visit, she was intensely jaundiced, and suffering from the most terrible itching of the skin which I have ever witnessed, and for this she specially sought relief. Finding that most of the usual remedies had been tried, I ordered a warm alkaline bath, which had a very beneficial effect. During the night she became quite incoherent, and greatly alarmed her friends, who of course blamed the bath. In the morning the itching had almost disappeared and she was rational, but complained of a deep throbbing pain in the heart. I examined her carefully, and made the following notes:—Body well nourished; thick layer of panniculus on abdomen. She says, however, that she has lost flesh in the past year. Skin of a deep greenish-yellow tint. In examining the abdomen, the edge of the liver cannot be felt; no tumour is evident below right costal border. She winces on firm pressure midway between navel and ensiform cartilage. Area of liver-dulness somewhat diminished; no tenderness over it. Splenic dulness a little increased; seven inches in vertical diameter. Heart and lungs normal. Tongue red, and indented with the teeth. Bowels regular; stools clay-coloured and offensive. Urine very dark-coloured, and contains much bile-pigment. Pulse 80; temperature 98.4°. Appetite is poor and she can only take soft food. During the next three days she improved,

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and the itching disappeared, except from the palms of the hands and soles of the feet. These she stated had been most troublesome throughout the attack, and the pads of the palms, at the bases of the fingers, were swollen and tender. By the 15th she was feeling much better, and the jaundice had begun to disappear. About noon on the 16th she had a severe paroxysm, the chill lasting nearly two hours, and at 5 p.m. I found her sweating profusely and much prostrated. During the cold stage she had constant relays of hot flannels wrapped round her, and hot bottles applied to the feet. The shaking was sometimes violent enough to move the bed and cause the room to vibrate. There was no vomiting with the attack, nor any special abdominal pain. On examination of the hepatic region no change was noticed. The following day the jaundice had become intensified and the urine much darker. From this time until Christmas-day she had seven attacks of varying intensity, five of which followed each other on the Fridays, coming on at noon. The temperature in one of the paroxysms reached 104°. The itching had come on again, but for some time starch powder gave relief; then it failed, and she returned to the use of cloths wrung out of hot brine, which had been found very serviceable. The "shake," on Friday, December 10, was very slight, and there was but little fever after it. The jaundice, which had been fading since the 3rd, did not become intensified, and on the 12th and 13th was less marked than at any time during my attendance. The urine was clear, and the feces were of a brownish colour. On the 15th and 17th there were paroxysms, and on the 18th she was again deeply jaundiced. From this date she improved very much, and has not had a definite paroxysm since. The jaundice has almost gone, and she has been able to be up and to get about the house. The appetite, also, has improved, and she has gained strength. On two occasions she has had severe headache, accompanied with great bodily depression, lasting for an entire afternoon, and followed by copious sweating. The itching has been much less, but the palms of the hands have at times been very sore. A troublesome symptom has been profuse sweating about the waist, sufficient to saturate the clothes and necessitating the wearing and constant renewal of cloths. The urine has been clear, free from bile-pigments, and the feces have been dark-coloured. I have examined the liver on several occasions, but have not found any alteration; the spot of tenderness in the right of the epigastrium persists.

The temperature throughout the illness has been from 96° to 98.2°, rising in the paroxysms as high as 104°.

The pulse has ranged from 60 to 90 per minute.

During last summer there was an interval of nearly six weeks during which she had no paroxysm and the jaundice disappeared.

The daily amount of urea was estimated for me by Dr. Henderson during a period of three weeks, but there did not appear to be any special diminution during the paroxysms. Acting on the suggestion of Dr. Kennedy, of Bath, Ontario, I gave her large doses of oil, in the hopes of inducing the passage of the calculus. She took three Florence flasks of it without any effect. Latterly she has been taking potassium bicarbonate and Bethesda water.

The similarity of the clinical histories of these two cases is very striking; the chronic jaundice, varying in intensity, and the febrile paroxysms are, with trifling deviations, the exact counterparts, and let us hope that the parallelism will be still further carried out by the passages of a gall-stone in the second case.

Considering how rich is the literature of gall-stones, I have been surprised to find very few references to this symptom. Occasionally in the reports of cases of chronic obstruction by English writers, shivering fits are mentioned. Thus, Budd,* in the history of a case of impaction of a large gall-stone in the common duct, which lasted many months, says: "Has lately had many fits of shivering, and sweats much at night. Never had ague, and the spleen is not enlarged." In the second edition of his work on the Liver, Dr. Murchison speaks briefly of periodic paroxysms of intermittent fever occurring in connexion with the lodgment of gall-stones in the ducts. The only full account which I know of is in Charcot's work. He has been able to collect twenty cases for analysis, and his conclusions, briefly put, are as follows:—1. The paroxysm begins suddenly with a chill, often severe enough to shake the bed; the temperature rises to 102° or 105.8°, and profuse sweating succeeds. 2. The periods of apyrexia are clearly defined. The fever comes on with the regularity of a quotidian, tertian, or quartan ague; but to this rule there are many exceptions. 3. In one instance Reynaud determined that the amount of urea was diminished during the paroxysm, whereas in true intermittent fever it is increased. 4. The paroxysms usually come on in the evening, while in genuine ague they most frequently occur in the morning. 5. The hepatic fever is chronic, and may last

* "On Diseases of the Liver," second American edition, page 219.

two or three months, with intervals of eight, ten, or fifteen days between the paroxysms. As many as thirty-one attacks have been known to occur. 6. A favourable termination is possible, as shown by a case of Henoch's; but a fatal issue is the rule. Death may take place suddenly, with symptoms like a pernicious malarial fever, or as a remittent fever with typhoid characters.

Dr. Charcot states that the condition of the bile passages which accompanies this fever is dilatation with inflammation of the mucous membrane, and the presence of pus or muco-pus. He suggests, in explanation, that a septic principle or pyrogenic material is developed by changes in the bile, and getting into the blood induces the chills and fever.

Though the cases which I have detailed to you conform in all essentials with Charcot's description, there are a few additional points of interest.

In both the course of the disease seems to have been, compared with other cases, greatly prolonged; nine months in the one, eighteen in the other.

The recurrence of the pyrexial attacks did not follow any definite order like true ague, but came on irregularly at intervals of from two to sixteen days. In Case 2, the "shakes" recurred on Friday, at noon, for five weeks.

One very remarkable feature in these cases I do not see mentioned, and that is the deepening of the jaundice after the attacks. No symptom was more constant, as some of you doubtless remember, in Case 1. It was rarely necessary to ask whether there had been a paroxysm, the colour of the face was a sufficient index. In the case of Mrs. S. the jaundice intensified very rapidly, often within eight or ten hours after the onset of the chill.

The cause of these repeated paroxysms must be confessed to be very obscure. Charcot supposes, as I told you, that a septic principle is developed in the dilated bile passages. Murchison suggests that "they are due to the simple irritation of the stone, and are analogous to the febrile paroxysms resulting from the passage of a catheter along the urethra." Certainly, in Case 12, the deepening of the jaundice and the absence of bile in the stools after the paroxysm favour the idea that a calculus, permanently lodged in the common duct, had shifted its position and had become for a time more closely wedged.

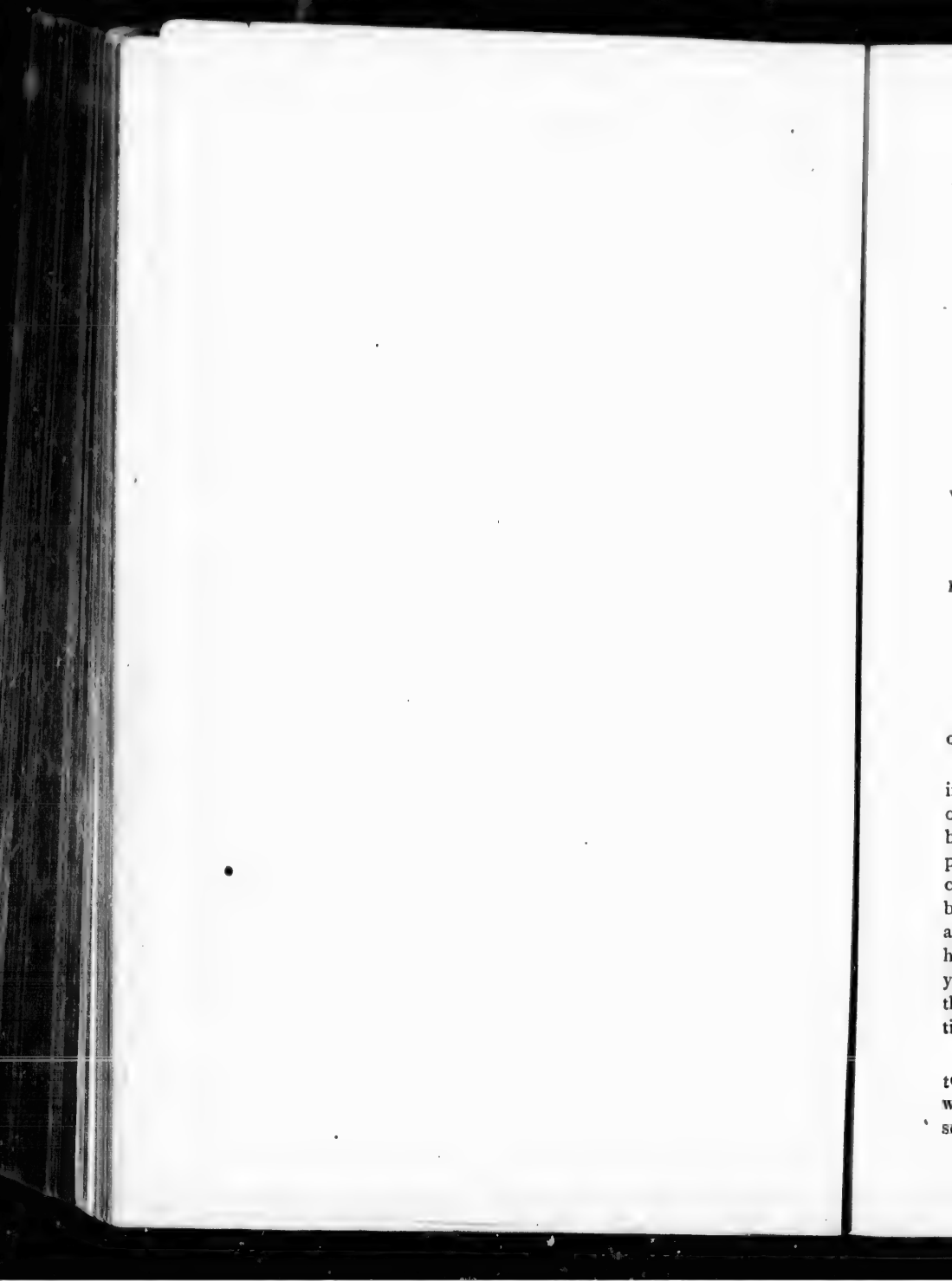
Influ. of uraemia and alcoholic poisoning on

Urinary capacity & Stephen Rogers

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RENAL CIRRHOSIS.



RENAL CIRRHOSIS.

WITH SPECIAL REFERENCE TO ITS LATENCY AND TO SUDDEN, FATAL MANIFESTATIONS OCCURRING IN ITS COURSE.

Being a Clinical Lecture delivered May 28th, 1881, in the Summer Session Course, by WILLIAM OSLER, M.D., M.R.C.P. Lond., Professor of the Institutes of Medicine, McGill University; Physician and Pathologist to the Gen. Hospital, Montreal.

(Stenographical Report by S. A. Abbott, Esq., of the "Hansard" Staff.)

GENTLEMEN,—I speak to you to-day upon renal cirrhosis, or chronic interstitial nephritis.

The various modes of onset of disease constitute an exceedingly important and interesting subject of study. You know that one of the very first questions we ask a patient is, how did the disease begin? The answers got to this question are very varied. One patient will say, it began suddenly; I was feeling quite well; it came on with a head-ache; I got feverish; I had a pain in my back; I was taken with vomiting; and various other answers, all of you have, no doubt, received in ascertaining the clinical history of cases. In another set of answers the patient will tell you that he cannot fix definitely the commencement of the disease; that he has not been feeling very well, but cannot state the precise time at which the failing health began.

Now I wish to call your attention in this particular affection to its remarkably stealthy method of onset. There is no disease with which we are acquainted which comes on so insidiously and so stealthily. Indeed, its victim may know nothing whatever of

the existence of any grave disease until he is prostrated by one of its severe accidents to which I shall shortly refer. It is this insidious course which makes it at once an exceedingly formidable affection and one worthy of your closest attention.

The patient before you offers a very good example of the disease in question, and has many of its most characteristic symptoms. I will read to you a concise clinical history of his case as obtained by Mr. R. J. B. Howard :—

E. L., æt. 31, sailor, large, strongly-built man, admitted May 18th, with headache, vomiting, and partial blindness. Has been a healthy man; a beer drinker and has occasionally gone on "sprees." Has had bubo; no evidence of secondary syphilis. Two years ago lost his nose from frost-bite.

When coming across on his last voyage, about 12 days ago, had a slight pulmonary disorder; the doctor called it inflammation. A week ago he had swelling and inflammation at inner canthus of right eye from lachrymal abscess. During these attacks he had headache, and latterly the feet have been swollen. On the 17th, the headache became much worse and partial blindness came on. Vomiting had been present for several days.

Condition on examination was as follows :—Well nourished man, good complexion, complains of headache and blindness, cannot see fingers six inches in front of the eye. Has perception of light. Pupils of medium size, respond to light, but there is a peculiar dull look about the eyes. Dr. Buller reports, "optic discs somewhat hyperæmic and indistinct at margins, nothing abnormal, retina present. Headache is general. Vomited last night and this morning. Bowels are freely opened. Tongue a little furred. Temperature normal. Chest well formed; apex beat half an inch outside the nipple line; impulse slow, heaving and forcible. Pulsations 60 per minute. Heart's dulness slightly increased. On auscultation, no murmur; sounds loud and distinct. There was nothing of special note in lungs. Examination of abdominal organs negative. Urine clear, light colored, sp. grav. 1009, acid, contains a moderate amount of albumen and numerous pale casts. Radial artery feels firm, pulse hard and strong, tension greatly increased."

The patient improved very rapidly. On the 20th he could count fingers, but could not see to read. The amount of urine

passed has been estimated, and found to be about 100 ozs. daily. Urea diminished, only 299 grains for the 24 hours. The headache has gradually disappeared and the vomiting is now checked. The feet are not swollen. The state of the urine remains unchanged. The circulatory symptoms persist; the high degree of arterial tension which exists is well shown by this sphygmographic tracing which I hand round.

Summing up the chief symptoms which this man had, they were: headache, vomiting, and disturbance of vision. These were the symptoms he complained of; but the symptoms which we discovered, and of which he had no knowledge, were—that he was passing nearly double the normal quantity of urine, that it was albuminous and contained hyaline and finely granular casts; that his heart was hypertrophied; that he had increased arterial tension, and that there was slight dropsy of the feet. This latter group of symptoms which I have mentioned, excluding altogether those he complained of when he came in, is alone sufficient to enable you to frame your diagnosis of the disease, particularly if they occur in connection with slight degrees of dropsy. There may be exceptions, but in the great majority of cases they will be sufficient for your purpose. The affection which is indicated by them is one of the forms of chronic Bright's disease. The three varieties of this disease, characterized according to the special morbid condition of the kidneys, are: first, that associated with the large white kidney; second, the form associated with the waxy kidney; and third, the form associated with the contracted kidney. It is the latter which this man suffers from.

Now in this disease the condition of the kidney is shown in the description of these organs from the girl who died in the hospital ten days ago, and the post mortem on whom most of you saw. Firstly, the kidneys are reduced in size. Secondly, on stripping off the capsule, you find it is thickened and opaque. Thirdly, the surface of the organ, instead of being smooth, presents a number of irregular nodular projections, or granules, large and small,—hence the term granular kidney. In stripping off the capsule, portions of the kidney substance adhere to it. Fourthly, on section, the organ cuts with great resistance, and it feels tough and hard. Fifthly, on examining the organ, you find that the cortical substance is greatly reduced, forming a very narrow zone

above the pyramids. In some places the pyramids approach to within a line or a line and a half of the surface. Sixthly, the arteries are noticed to be unusually distinct, particularly those at the bases of the pyramids, and they often project above the level of the substance. Small cysts are also common, but they are not seen in this specimen. The color of the organ, in this special instance, was pale and not reddish. The pyramids were reddish, but the general color of the organ was pale grey. These are the coarse features of the kidney in this form of Bright's disease.

Microscopically, as you will see in a section taken from this organ, the chief characteristic is an enormous increase in the fibroid elements of the organ. In a healthy kidney there is only a very small amount of fibrous tissue between the tubules, around the Malpighian tufts, and about the arteries of the organ. The amount is so small that Dr. Beale, one of the leading histologists in England, denies the presence of a special fibroid framework of the kidney. But in this affection you will see that between the tubules, there is a large amount of a new growth of fibrous tissue. The tubuli uriniferi, instead of being in close apposition, are separated from each other by distinct zones of fibrous tissue, and the Malpighian bodies are also surrounded with the new growth. The arteries are much thickened, both in the adventitia and in the muscularis. The condition of the renal epithelium in the tubes varies a good deal. In some tubules you will find it healthy looking, in others it is degenerated, granular and fatty; so that in reality the essence of the process is, just as in the case of the fibroid lung of which I spoke to you the other day, and as in the case of the fibroid liver, an over-growth of the connective tissue of the organ. This produces atrophy of the secreting structure, and impairment of the function of the gland.

Associated with the small, contracted kidneys you have a remarkable condition of the circulatory system. The arteries of the body are thicker and firmer than is natural, particularly the smaller ones. There is usually atheroma in the larger vessels. With reference to the special change which goes on in the smaller vessels, there is still a great deal of dispute. Drs. Gull and Sutton believe that the change is chiefly in the outer coat. They call this degeneration arterio-capillary fibrosis, a fibroid change in the small arteries and capillaries. Dr. Johnson believes that

the change is chiefly in the middle coat, resulting in hypertrophy of the muscular elements. Drs. Gull and Sutton hold that the changes in the arteries and the changes in the kidneys go on simultaneously, and are both the expression of a common cause; whereas other writers think that the changes in the arteries are secondary to the changes in the kidney. In addition to these muscular changes, the heart is found hypertrophied, more particularly the left ventricle. It is increased in thickness and the muscular walls are hypertrophied. Thus cirrhosis of the kidney, arterial degeneration, any hypertrophy of the heart, are the three main pathological features of this form of Bright's disease which you meet with in a post mortem.

The hypertrophy of the heart, which is a very constant symptom, is supposed by Traube to be due to the increased difficulty with which the blood circulates through the kidney, owing to the destruction of a large number of Malpighian tufts. It is, according to this view, a compensating hypertrophy, that is to say, hypertrophy makes up for the destruction of a considerable vascular area in the kidneys. Others think that the hypertrophy is the result of chronic changes in the arteries, in which the arteries of the kidney participate. Bright's view with reference to the hypertrophy of the heart was, that the blood in kidney disease not being so pure as in health, did not circulate through the capillaries of the body with the same facility; hence the need of the heart to increase its force of contraction in order to propel the blood.

A knowledge of the condition of the heart and arteries is a key to explain many of the symptoms of this form of kidney disease. Thus, one of the remarkable features of this disease, remarkable in contrast to the other varieties of Bright's disease, is the large amount of urine secreted. This man has been secreting double the normal amount of urine. This would appear to be due to the hypertrophy of the left ventricle, and to the increased blood pressure within the arteries. You know how much the watery part of the urine depends upon vascular pressure. As a rule, the greater the blood pressure within the renal vessels, the greater the amount of water which is filtered through the Malpighian tufts. Though there is a great destruction of these tufts in renal cirrhosis, still the compensating hypertrophy of the heart is not only sufficient

to counterbalance their loss, but even so to increase the pressure in the remaining tufts that a larger amount of urine is filtered off. That this is the case is shown by several circumstances. In the first place, if you keep a patient with this form of kidney disease absolutely at rest the amount of urine diminishes. This fact has been established by Bartels after several very careful observations. At rest the blood pressure is not so great as when the patient is moving about, as the pulsations of the heart are not so forcible. Then, so soon as hypertrophy of the left ventricle begins to fail, when degeneration comes on, the amount of urine diminishes while its specific gravity increases.

Among the most remarkable symptoms of chronic Bright's disease, are those which come under the heading of *uræmia*. This term was first used when the symptoms grouped under it were all believed to be due to the poisoning of the blood with urea. That view has now been considerably modified, but the old term which embraces these symptoms is still retained. I shall not speak fully with reference to the supposed causes of uræmia further than to mention that some still suppose it to be caused by the retention of urea; others, that it is due to the presence of carbonate of ammonia in the blood. A third view is that it is neither of these substances, but those bodies which we call the antecedents of urea, creatinin, tyrosin, &c., the various nitrogenous excreta, or the products of the waste of the tissues. A fourth view is that these symptoms of uræmia are due to oedema of the brain.

Now, among these manifestations of uræmia some are trifling and others are exceedingly grave. Among the minor manifestations may be mentioned those which this patient has suffered from—headache, vomiting and impairment of vision. The more severe symptoms are convulsions, delirium, coma, sudden oedema of the lungs or of the glottis, inflammation of a serous membrane, pleurisy, pericarditis, and meningitis. This patient before you has only suffered from the minor manifestations of uræmia, but I would like you all to have this case fully impressed upon your minds, particularly with reference to what I am going to tell you later as to the insidious nature of this disease. You remember that when we first saw this man we did not think of any kidney trouble, but from his symptoms and appearance that he most

probably had some cerebral disease. When I first saw him on the day of his admission my first thought was that he had probably cerebral syphilis, mistaking the ragged condition of his nose for an effect of lues. He had the vomiting, the headache, and the disturbance of vision, three important symptoms of intra-cranial mischief. I would direct your attention specially to the disturbance of vision inasmuch as it is an important symptom, and you will probably not see this form of visual disturbance for some time again. It is what is known as *uræmic amaurosis*. I mention it because I wish you to distinguish it carefully from another form of impaired vision common in chronic Bright's disease, viz., *retinitis albuminurica*. In uræmic amaurosis the cause of the impairment of vision is cerebral. The examination of the retina is negative. Its clinical features may be briefly summed up in the rapidity of its onset, the shortness of its duration, and the quickness of its departure. It rarely lasts any length of time—in this man only three days—whereas in the retinitis albuminurica, the impairment of vision comes on slowly, the cause is peripheral, and there is a definite lesion in the retina, chiefly seen about the macula, in the form of small hemorrhages, and with these there is usually some swelling of the disc. In this form the impairment of vision comes on slowly and is rarely so severe as in the uræmic amaurosis.

But that to which I wish specially to call your attention to-day—and I am sorry to have had to take up so much time in clearing the ground—is the fact that *these severe symptoms of renal cirrhosis may break out in all their violence in an individual who may consider himself in perfect health, and who may be so considered by his friends, and even by his medical adviser, if the latter has not carefully examined into his case.* The case of the patient who was admitted under my care on the 7th of May, and who died after a residence of two days in the hospital, has directed my attention to certain points in connection with the insidious course of cirrhosis of the kidney.

The first manifestation of the disease may be the onset of severe cerebral symptoms, convulsions, delirium or coma.

Cases in point are as follows:—A friend of mine, aged 30, a fellow student, and a man whom I had known since 1863, a graduate of McGill College, a strong healthy man, and in active

practice, was suddenly seized with convulsions which came on at night with few, if any, premonitions. The day previous to their onset he had done his work as usual and appeared to be, as his wife expressed it, "in radiant health." The examination of his urine by the attending physician showed the presence of albumen and tube casts, and the diagnosis of chronic Bright's disease was made. He became comatose and died in a few days. I saw him a few months before his death and he looked in his usual vigor. He made no complaints of failing health nor were any alterations perceptible on his countenance. Six or eight months before he had had considerable domestic and mental trouble, owing to the sudden death of his father, and he had not been well for several weeks at that time, but apparently had recovered completely. He had no idea whatever that he was in this dangerous condition. It is to be noted that prior to this attack he was a good deal worried and anxious about his children who were ill.

The first manifestation may be delirium passing on to coma. That was seen in the patient named Weir who was admitted on the 7th of May. I will briefly call your attention to the main features of his case.

This patient was a vigorous and healthy man, aged 44, a foreman in G. T. R. employ. Habits temperate for past ten years, previously had been a drinker. Had been in usual health, but had complained of headache, and his wife stated that he had passed water more frequently of late. On May 6th he was admitted with an active delirium which had come on suddenly 36 hours before. Urine found to be albuminous and contained granular casts. The symptoms were regarded as uræmic. He became comatose on the 7th, and he died at 2 a.m. on the 8th, after an illness of a little over three days. A point to be noted in connection with this case was that the patient had had a great deal of mental worry at the time as a strike was going on. The *post mortem* did not reveal extensive renal cirrhosis, as was anticipated, for the kidneys, as you see, are not reduced in size and do not present the external characteristics of interstitial nephritis, but they were firm, and on microscopical examination there is evidence of a chronic nephritis. The arteries are thickened, some of the Malpighian tufts are degenerated, and there is an increase in the fibrous tissue about the capsules. A fact to be learned from this case is that severe uræmic symptoms

may develop at a very early stage in renal cirrhosis, even before the characteristic contraction of the organ occurs. This is, of course, very uncommon, but that it does take place is evident from this case.

The third case illustrating the suddenness of the onset of cerebral symptoms in this disease was that of the girl who died about ten days ago, and from whom these kidneys were taken. She was 26 years of age, and up to the time of her admission to the hospital had not suffered from special symptoms of kidney disease. She came in suffering from headache, vomiting, and hæmorrhage from the nose, uterus and navel. She got dizzy, had convulsions, became comatose and died. The urine was albuminous and contained casts. The condition of the kidneys was as you now see in these specimens. The occurrence of hæmorrhage is worthy of your attention, as it is occasionally seen as one of the severe symptoms in Bright's disease. In the case of this patient it is also worthy of remark that she was friendless and had been ill-treated for years. These three cases will serve very well to illustrate the fact which I wish particularly to impress upon you, namely, that severe uræmic symptoms may be the very first manifestations to the patient, to his friends, or his physician of the existence of kidney disease.

The importance of a knowledge of these facts is also very evident from a consideration of the medico-legal aspect of such cases. You may be called to attend a man in a profound coma, who has been stricken down suddenly without any premonition, and while attending to his business, and he even may die in three or five hours under circumstances at first suggesting narcotic poisoning.

The first manifestation may be an apoplectic seizure.

In October, 1879, one afternoon as I was going down stairs prior to my lecture at the College, one of the veterinary students, aged about 25, while coming in through the side entrance, was taken with apoplexy before my very eyes. He leaned against the wall and stated that he was powerless in his left side. We helped him into the waiting-room, and from the suddenness of the onset I supposed at once he must have heart disease and apoplexy. On placing my ear on his chest I perceived a pronounced, heaving impulse of the heart but no murmur. There

was marked cardiac hypertrophy. By the time we got him to his boarding house the paralysis was complete on the left side; he had lost consciousness and was becoming comatose. He was taken to the hospital and we examined his urine, which was clear, albuminous, and contained numerous casts. The arterial tension was increased. He died in 24 hours. That young man had never suffered from any special symptom pointing to renal disease. He had been attending to his work as usual, though he had never been very strong, and on several occasions I looked at him thinking he might have some constitutional disease. He did not look healthy, but the only things he had complained of, had been occasional headaches and palpitation of the heart, and so far as I remember he had not consulted a doctor.

Another case in which the first severe symptom of renal cirrhosis was apoplexy occurred under Dr. Ross' care two years ago in 23 Ward. A woman came in with hypertrophy of the heart, high arterial tension, albuminous urine, and casts, finely granular in character. Cirrhosis of the kidney was diagnosed, and she was placed under suitable treatment. Three days after admission to the hospital she died in two hours with an enormous apoplectic effusion into the brain.

The arterial degeneration in this affection renders the vessels fragile, and the powerful contraction of the hypertrophied left ventricle is a source of constant danger. A large proportion of all cases of apoplexy occur in connection with contracted kidneys, owing to the existence of these two factors.

A third way in which this disease may declare itself is by inflammation of some serous membrane, the pericardium, the pleura or the meninges of the brain.

A case which early called my attention to the insidious nature of this disease was the following:—A florid, full-blooded Englishman, an old sailor, aged 63 years, who had usually enjoyed excellent health, though he had occasionally, I believe, suffered twinges of gout, was suddenly seized with symptoms of an acute febrile affection, had high fever and considerable constitutional disturbance. To make a long story short, he died at the end of four days of acute sero-fibrinous pericarditis. He had a large exudation in the pericardium. The only other disease found in his body was fibroid kidneys, perhaps of gouty origin,

as gout may be a very important factor in the production of this disease.

The fourth sudden manifestation in this disease to which I will direct your attention is œdema of the glottis, or more frequently of the lungs.

Three years ago an old man was brought from the House of Refuge to the Hospital, suffering from intense dyspnœa. On examination of the lungs hydro-thorax of the left side and œdema of the left lung were diagnosed. He refused all treatment, and died within 36 hours of his admission. The *post-mortem* revealed small contracted kidneys, intense œdema of the left lung and hydro-thorax of the opposite side. The effusion and transudation of serum takes place sometimes into the pleural cavity and sometimes into the lungs. In this case there were no adhesions on the left side, while in the other side there were extensive adhesions and the transudation took place into the lungs. There was no œdema of the legs in this instance. The urine was albuminous and there were casts.

An interesting point in connection with the occurrence of this cedematous effusion is the fact that Traube attributed the uræmic symptoms in this disease to the serous transudations, and the post mortem of the man Wier favors this view, as there was considerable œdema of the membranes of the brain and a good deal of moisture throughout the substance.

These are certain of the modes of termination of cirrhosis of the kidney with which you should be acquainted and which it is exceedingly important you should bear in mind.

Now, among other symptoms which I will only mention in connection with this chronic form of Bright's disease, there is the occurrence of a dyspnœa, uræmic asthma, without evidence of œdema of the lungs or chronic bronchitis, dependent upon cerebral causes. It is of rare occurrence, but it is a condition which you should bear in mind. The bronchitis, the vomiting, and diarrhœa are also symptoms to which I will not further refer.

The importance of a knowledge of these symptoms and these sudden manifestations in renal cirrhosis cannot be over-estimated. I have had two life insurance cases referred to me within the past few years, both of which bear directly upon this question. In one the patient had an Accident Insurance Policy. He fell

on the ice and was stunned ; felt unwell for some days, but did not see a doctor. Three or four months after, I forget the exact time, he was seized with apoplexy. The post mortem revealed contracted kidneys. The question was brought up as to the connection of the accident with the subsequent event. My opinion was asked, as the friends had some idea of contesting the case in the courts, but the existence of renal cirrhosis was to my mind quite sufficient to account for the apoplexy.

In the other, a middle-aged man had insured his life about seven months before his death, which took place quite suddenly. The autopsy disclosed very great atrophy of one kidney and a large red state of the other. No very satisfactory report was obtained of the state of the other organs, and the actual cause of the sudden death remains doubtful. But I have no doubt whatever that it was connected with the condition of renal inadequacy. My opinion was asked as to the possibility or probability of this man not being aware that he was unsound at the time of insuring. After the cases which I have narrated, illustrating the latency of chronic renal disease, you need not ask what my answer was. From the point of view of life insurance, there is no disease about which a company should be more on its guard. Its peculiar insidiousness will have become evident to you by the cases I have cited. The stealthy nature of the disease is increased by the fact, that albumen is not constantly present in the urine. A single examination is not sufficient to enable you to state positively upon its presence or absence, and it is often very slight in amount ; and though you may examine for casts, you may go over a dozen slides before finding one. A patient may come to you who is passing a large quantity of urine, so that he has to get up, perhaps, two or three times in the night (that may be what he comes to complain of) ; the urine is of low specific gravity and contains albumen—perhaps only in traces. The daily amount of urea is decreased. It deposits, not a thick heavy sediment, but a light cloudy one, which on examination is found to contain hyaline and finely granular casts. There may or may not be œdema of the ankles. If you also find on examination that his heart is hypertrophied, that the arterial tension is increased, you may be tolerably positive with reference to your diagnosis—the man has fibroid degeneration of the kidneys. To be forewarned in such a case is to

be forearmed, and a knowledge of what you may expect in these cases will enable you to take measures for the prevention, if possible, of the severe manifestations of which I have spoken. If a patient comes before you with these symptoms, you should see that the amount of his urine is kept up, and on no account allow it to diminish; that his pulse is kept thoroughly well regulated, and that he lives a quiet regular life and does not go to any excess in eating or drinking. The treatment of the affection is in great measure a treatment of symptoms. Acting with cathartics upon the bowels and keeping the amount of urine up to the standard, are among the most important means to be taken.

NOTE.—June 7th. The patient who was shown to the class on the occasion of the above lecture was recently discharged, feeling as he expressed it quite well. He was still passing about 80 ounces of urine in the day, with albumen and a few casts. He looked well, fit for life insurance, and would pass in many examinations such as I have witnessed. Yet I know of no more likely candidate for sudden death than this same patient, who has the sword of Damocles hanging over his head, ready to fall with fatal effect when the tiny hair which suspends it is suddenly broken by the onset of convulsions, or one of the other accidents to which such patients are liable.

CATALOGUE
OF A
SERIES OF SPECIMENS ILLUSTRATIVE
OF THE
MORBID ANATOMY
OF THE
BRAIN AND SPINAL CORD.

Exhibited at Ottawa Meeting of Canada Medical Association, Sept. 1st and
2nd, 1880, by William Osler, M.D., M.R.C.P., Lond.

BRAIN.

No. 1. Section of brain (made with Dalton's section-cutter) showing large apoplectic clot *in situ*.

Woman, aged 40, cirrhotic kidneys, hypertrophied heart, sudden hemiplegia with coma, and death in two hours.

No. 2. Hæmorrhagic softening, probably from embolus.

The lesion in this case involved chiefly the band of white matter (int. capsule) between the caudate and lenticular nuclei of the corpus striatum, and it illustrates the truth of Charcot's view that the motor path is in the anterior part of the internal capsule.

No. 3. Cortical softening from hæmorrhage of traumatic origin.

This specimen is exhibited to illustrate how beautifully superficial lesions are shown in brains preserved by Giacomini's method (see N. Y. Med. Record, April, 1880).

No. 4. Apoplexy of pons.

No. 5. Cicatrix of apoplectic clot in cerebellum.

Both of these specimens are from the same case, a woman aged 40, dissipated. The lesion in cerebellum dates from a year before patient's death, and is a good example of a healed injury to brain substance. She remained dull and stupid after the attack, and there

was inability to use the legs freely, though they were not paralyzed; sensation was impaired. Death followed the hæmorrhage into the pons. The cerebral vessels were extensively diseased.

No. 6. Abscess in left temporo-sphenoidal lobe.

From a case of mastoid disease. There was no paralysis; headache, dullness and occasional inability to express himself freely were the chief brain symptoms.

No. 7. Embolism of left middle cerebral artery.

The embolon is seen *in situ*. Case of young girl with mitral stenosis and numerous vegetations on the valves. Sudden right-sided hemiplegia with aphasia. Red softening of third left frontal convolution and neighboring parts supplied by middle cerebral.

No. 8. Aneurism of left middle cerebral artery.

Aneurisms on branches of the cerebral arteries are more common than is supposed. I have met with six cases in four years, two on the basilar, three on branches of the left middle cerebral and one on the anterior communicating. In four of these death was caused by bursting of the sac.

No. 9. Miliary aneurisms on small cerebral arteries.

The structures, described by Charcot & Bouchard, are supposed to play an important rôle in the causation of cerebral hæmorrhage, particularly in old persons. They result from a periarteritis which weakens the wall, leads to a local dilatation and final rupture. The statement of these authors, that they are to be found in every case of apoplexy in old persons, is not, in my experience, correct.

No. 10. Coarse tubercle of brain.

Irregular masses about the vessels in the sylvian fissures.

No. 11. Section of coarse tubercle of brain.

The part shown is just at the border of a mass the size of a pea; There are numerous small tubercle cells embedded in a granular matrix, two giant cells are also seen. Internally there is a granular degeneration of the cells (caseation) and an obliterated vessel can be seen.

No. 12. Miliary tubercles on small arteries.

From case of acute hydrocephalus. The tubercle cells are seen in outer coat (adventitia) of the small arteries. The increase of these causes a bulging which can be, in small arteries, seen with the naked eye, and the calibre of the vessel may be greatly deduced or even obliterated.

In the case from which this specimen was taken, there was no *basilar meningitis*, i. e., no exudation of lymph about the base,

but on carefully removing the pia mater and examining the vessels, particularly those of the perforated spaces, the little tubercles were seen on the small arteries.

No. 13. Syphilitic arteritis.

From a man aged 36; syphilis 18 months before death, which followed rupture of an aneurismal dilatation of the basilar caused by the arteritis. In this specimen, the alteration consists in a very great thickening of the *intima*, which in places is of greater diameter than the other coats together; the cellular elements are few in number, the chief part of the new growth consisting in a low form of fibrillated tissue.

No. 14. Glioma of corpus striatum.

Tumor consists of small round cells, like those of a small-celled sarcoma, embedded in the meshes of a reticulum of fine fibres.

No. 15. Pachymeningitis.

A localized spot upon the frontal lobe in the case of a young man, the subject of severe epilepsy.

There is thickening of the dura mater and adhesion to the arachnoid and pia. There has been extravasation in the thickened membranes as evidenced by numerous hamatoidin grains.

No. 16. Insular sclerosis.

Localized areas of fibroid transformation, usually in the white matter, the result, it is supposed, of a chronic inflammatory process. The substitution of the white substance by a fibrillar growth is well seen in this specimen. Many of the fibres are in connection with elongated corpuscles. The development of these patches in the brain and spinal cord causes a well-recognized form of disease, characterized by a remarkable tremor, &c.

No. 17. Medullary neuroma.

New growth (heterotopia) of grey matter on thalamus opticus, with extension into third ventricle; chronic hydrocephalus from pressure on vein of Galeni. Intellectual faculties retained. Girl aged 16.

The section shows the finely granular grey matter, a ganglion cell and numerous smaller (nerve) corpuscles.

No. 18. Pigmentary degeneration of cerebral vessels.

In case of apoplexy of the pons, cerebral vessels were much diseased, whereas the general arteries of the body were but slightly involved. Many of the smaller arteries present the peculiar pigmentary change in the adventitia, seen in the specimen, the deposition being chiefly in spider-like connective tissue cells.

CORD.

No. 19. Locomotor ataxia, posterior spinal sclerosis.

Thickening of the neuroglia with compression and atrophy of the nerve cylinders constitutes the essence of the disease termed sclerosis or grey degeneration.

No. 20. Descending degeneration of crossed pyramidal column.

This specimen illustrates the secondary degeneration which takes place in the cord after a destructive lesion in the brain, which has involved the motor path. In this case there is no degeneration as there often is in the situation of the direct pyramidal fasciculus, *i. e.*, in the part of the anterior column next the median fissure on the same side as the lesion.

No. 21. Antero-lateral sclerosis.

Degeneration of anterior horns of grey matter with sclerosis of antero-lateral columns. It is characterized clinically by atrophy of the muscles with contractures, and must be distinguished from progressive muscular atrophy, in which the anterior grey matter is alone diseased and there are no contractures.

I am indebted to my friend Dr. Gowers for this beautiful specimen.

No. 22. Ascending degeneration of posterior median columns.

When there is a focus of chronic disease at any point in the cord which impairs its function, these columns above the seat of disease become atrophic. No symptom is known to be connected with this process.

No. 24. Annular myelitis.

Sclerosis chiefly cortical, deepest in posterior parts of lateral columns. Section from level of 6th dorsal nerve, in case of spastic spinal paralysis.

No. 24. Lateral sclerosis.

In case from which preceding specimen was obtained. In the lower dorsal the sclerosis was chiefly, as seen in this specimen, in the hinder part of lateral columns and near the posterior nerve roots. The special symptom connected with disease of these columns is rigidity of the muscles.

No. 25. Tumour, probably syphilitic, of the cord.

Specimen from Dr. Gowers.

XLIII

NOTES ON
Intestinal Diverticula.

By WILLIAM OSLER, M.D.,
OF MONTREAL.

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R E P R I N T.
—

BROOKLYN, N. Y. :
ANNALS OF ANATOMY AND SURGERY,
28 Madison Street.
—
1881.

NOTES ON INTESTINAL DIVERTICULA.

By WILLIAM OSLER, M. D., M. R. C. P., LOND.,

OF MONTREAL, CANADA,

PROFESSOR OF THE INSTITUTES OF MEDICINE IN MCGILL UNIVERSITY.

HAVING found a somewhat unusual specimen of the above abnormality at a recent autopsy, I was reminded of other instances which had come under my notice, and have thought that a few notes on the subject might be of interest to the readers of the ANNALS OF ANATOMY AND SURGERY, particularly as the information to be obtained from ordinary anatomical works is exceedingly meagre. Even in Henle's large work the matter is dismissed in a few lines. Some of the text-books on morbid anatomy contain very good accounts, as in Jones and Sieveking (Payne's ed.), and Birch-Hirschfeld; but for a full and satisfactory description we must go to the works of the great Meckel (whose name the single *diverticulum ilei* commonly bears) where, in the "Handbuch der Pathologischen Anatomie" (1812), the subject is treated at great length, and we have an admirable example of the thoroughness with which the older anatomists did their work. No detail has escaped him, and I doubt if any new point in structure or mode of development has since been determined.

A division is made of the forms of diverticula into true and false, or congenital and acquired.

The true diverticulum, Meckel's diverticulum ilei, is a rather

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common abnormality, occurring, in my experience, in somewhat over two per cent. of bodies. I have met with twelve instances in about 550 inspections. It is invariably solitary, springs from the ileum opposite the mesenteric border, at a distance of three or four feet from the valve, and is distinguished from a false diverticulum by the presence of all the tunics of the bowel. It varies in length, in the specimens which I have examined, from one to six inches, and, when distended, is cylindrical in form or, in the small ones, funnel-shaped. The size of the canal is usually smaller than that of the intestine; in one instance only have I seen it of equal width. It is sometimes wider at the distal end than at the orifice, which may be protected by a valvular fold. The blind extremity frequently presents one or two saccular dilatations. It is usually attached at right angles to the bowel, but in several of my specimens the direction is oblique. The extremity may be free or have attached to it a fibrous cord, which passes to the abdominal wall in the region of the navel. In one instance I found a fibrous and fatty cord passing from the end of the diverticulum to the adjacent mesentery, forming a noose which admitted three fingers. Specimens have been described with a definite fold of mesentery attached along one border. When inverted the mucosa resembles that of the ileum, and large specimens often contain Peyer's patches.

Prior to Meckel's observations, this process was believed to originate either by distension of the bowel or by the dragging of adhesions from without. He showed that it was congenital, and offered a rational explanation of its occurrence as a remnant of the omphalo-mesenteric duct which connects the primitive intestine with the umbilical vesicle. The different degrees of malformation which may arise from the existence of this communication are thus described by Birch-Hirschfeld,¹ and it was the existence of these various

¹ Loc. cit.

grades that led Meckel to the happy solution of the question: "The malformation, which is to be regarded as an arrest in the development of the bowel at one of the steps when it is in connection with the umbilical vesicle, exists in the most extreme degree when there is a fissure in the abdominal wall below the navel, through which the ileum opens. The lower part of the bowel is, as a rule, very narrow or completely closed, and the fæces pass through the opening at the navel. In the next grade the abdominal fissure also exists, and the ileum is in direct communication with the opening at the navel by means of the patent ductus omphalomesaraicus, but at the same time the lower part of the bowel is well developed and the fæces pass into the colon. Then, there are those instances in which the ventral fissure is closed, and a blind process of the ileum exists which is united to the navel by the obliterated ductus mesaraicus, represented as a solid fibrous cord; and, lastly, as the slightest grade, the omphalo-mesenteric duct remains as a free diverticulum from the ileum."

The interest in this abnormality is not merely anatomical, as its presence is accompanied with certain dangers, and in a large number of cases it has been the cause of fatal mischief. In a few instances in which the process has extended into the navel-string as a narrow canal, it has been cut in the separation of the child. The chief danger arises when the extremity of the diverticulum is attached to the abdominal wall or contiguous parts. Many cases of strangulation of the bowel have been reported from this cause. More rarely acute obstruction has occurred from constriction of the bowel in the neighborhood of the process—Dr. Southey has reported two such cases.¹ When unattended it is seldom a source of trouble. Occasionally foreign bodies enter and excite inflammation, as in a case reported by P. Beale,² in

¹ Clinical Society Transactions, vol. v.

² Path. Society Transactions (London), vol. v.

which cherry-stones and orange-pips were found, and in one by Mr. Doran,¹ in which a pea had excited ulceration. I have not met with a recorded instance of trouble from impaction of hardened fæces. Typhoid ulceration has been found in a Peyer's patch in the diverticulum. I saw an interesting specimen of this at the New York Pathological Society last Winter, and a case of perforation of such an ulcer is reported by Dr. Galton.² The process sometimes finds its way into one of the peritoneal rings as a hernia. Littre (1700) and Mery (1701) are quoted by Meckel as having reported cases of this kind. Dr. Dowse has recorded³ a curious instance of a woman aged 77, who was attacked with vomiting and pain in the groin, where ultimately a fæcal fistula became established. Patient died three months after, when a diverticulum ilei was found to have passed into a direct inguinal sac, becoming adherent, inflamed and perforated. Dr. Hare⁴ met with a diverticulum $1\frac{3}{4}$ inches long in the inguinal canal in a patient who had had several attacks of abdominal pain, with vomiting and constipation, during one of which he died. The bowel was constricted above the process, which Dr. Hare regarded not as a congenital diverticulum, but as a portion of the bowel which had become adherent at the ring and gradually drawn in. I met with a somewhat similar instance, and it was difficult to decide whether the small hernia was a true diverticulum or only a portion of the bowel drawn into the ring.

The *false diverticula* occur in any part of the intestinal canal, often in large numbers, are usually situated at or near the mesenteric border, and seldom consist of more than the mucosa, which forms a sort of hernial protrusion. If we except the little saccular diverticula the size of small peas,

¹ Ibid, vol. xxix.

² Ibid, vol. xxiii.

³ Lond. Path. Soc. Reports, xxvi.

⁴ Ibid, vol. vii.

Case 111. 14 diverticula on promontory & colonos in mesenteric area

of which an occasional instance is not uncommon, this variety is less frequent than the other. I have notes of only three or four such. In one a protrusion the size of a walnut existed in the duodenum just below the papilla. It communicated with the bowel by a wide orifice, and appeared to consist chiefly of the mucous coat, though no rent was evident in the muscular coat, which appeared rather thinned and wasted. I met with a most remarkable instance a few weeks ago in the person of a man aged 65, who died of an acute enteric attack with *melæna*.¹ The jejunum presented fifty-three diverticula on the mesenteric border—all of hemispherical shape and attached by broad bases. They ranged in size from a cherry to a large apple. One measured 8 by 6 cm. Six of them were larger than billiard balls. The walls were somewhat thinner than those of the intestine, but the larger ones presented a distinct though thin muscular investment. All contained fluid *fæces*; two of the larger ones were fully distended. The mucous membrane looked normal, but was, perhaps, a little thinner than in the bowel. The *valvulæ conniventes* were absent. When distended with air and dried, and openings made in the bowel opposite the diverticula, it was seen that some of them had imperfect valvular folds at the margins of the orifices. They lay between the peritoneal surfaces of the mesentery, and numerous blood vessels coursed over them. There were not any in the ileum or colon. They were not connected with the acute enteric trouble which caused death, and which was situated in the lower part of the ileum. So far as could be ascertained, the patient had not been a very constipated man, but had for years been subject to colicky pains in the abdomen, which may have been associated with these diverticula.

¹ I am told by Dr. Trenholme that for years the patient had suffered much from loud rumbling noises in the belly, particularly after each meal. So loud were they that it was his habit, shortly after eating, to go out to take a walk and keep away from people, as the noises could be heard at some distance.

In the large intestine I have met with two instances of curious diverticula forming globular sacculi the size of large peas or cherries; very numerous in one case along the whole colon, in the other, confined to the lower part, and consisting of thin pouches of the gut filled with firm faecal concretions. The number and arrangement gave a very peculiar appearance to the bowel when distended. They were not connected in any special way with the appendices epiploicæ. In one case the faecal masses were of almost stony hardness, owing to the presence of lime salts. Many cases of this sort are reported—one by Mr. Sidney Jones¹ terminated by the ulceration of a sacculus into the bladder.

The false diverticula are caused, in the majority of cases, by distension of the bowel either by fæces or gas, and are rarely more than hernial protrusions of the mucosa. The occurrence in such numbers as in the above reported case is uncommon. Dr. Gross, in his "Pathological Anatomy," 2d ed., p. 601, figures a somewhat similar specimen, and refers to other cases seen by Monro, Cruveilhier and Sir Astley Cooper.

¹ Lond. Path. Soc. Transactions, vol. viii.

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